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CONSISTENT… ME? BARRIERS AND CONSTRAINTS ON PROENVIRONMENTAL BEHAVIORS

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Abstract

Research on environmental behavior continues not to answer the question: why don’t people behave the way we want them to? Or differently, what are the barriers and constraints to proenvironmental behaviors? For this a model is proposed and from this, habit is studied as a barrier, being defined as goal-directed automatic behavior that is mentally represented and can be triggered by environmental cues (e.g. Aarts & Dijksterhuis, 2000). Accordingly, it shares some characteristics with other types of mental representations such as stereotypes and attitudes for example, namely its dynamism which results from the interaction between the situation and cognitive processes. Based on the Theory of Systems Goals (Kruglanski et al., 2002) and the mental constructs activation rules (Higgins & Brendl, 1995), habits can also be considered to result from the interaction between 2 sources of activation: context applicability (in our studies defined as perceived applicability of habit to the means to attain the goal present in the decision context) and cognitive accessibility (through goal priming or chronicity). We manipulated these in a number of online shopping simulations organic vs. non-biological products buying or habitual vs. non-habitual products buying. Results demonstrate a perceived applicability effect with more habitual (studies 2 and 3) or non-biological (study 1) products chosen in a familiar than in a new context and greater consistency in non-organic choice within 3 choices in the same list (study 1). Strong habit participants (high chronic accessibility) consistently choose the habitual product even when context changes (study 2). The goal priming does not show the expected effect (study 2 and 3) and may indicate the presence of goal activation suppression effects (Study 2). Finally, results indicate that habit can resist the effect of implementation intentions (study 4) or be "broken" for certain context changes (studies 5a + 5 b).

Key words: Environmental behavior; Consumption; Barriers and constraints; Habits.

Resumo alargado

Apesar da premente necessidade de desenvolvimento de condutas protectoras do ambiente, dos elevados níveis de preocupação a este nível e positividade das atitudes em vários países (Ferreira Marques, Palma-Oliveira, Marques, & Ferreira 1995), o número de pessoas que age de forma ambientalmente positiva permanece muito baixa, demonstrando uma inconsistência entre atitudes e comportamentos ambientais. Apesar de este problema ser conhecido há muitos anos e de se ter tornado clássico ao nível da Psicologia Social, ao nível da Psicologia Ambiental e ao nível da Psicologia do Consumidor continua a gerar debate e a não ser respondido eficazmente. De facto, no que concerne à investigação do comportamento pro-ambiental e consumo ecológico no âmbito destas disciplinas, há muitos anos que se tenta encontrar "factores de inconsistência" – factores que podem influenciar negativamente o comportamento ambientalmente positivo, ao torná-lo inconsistente com as atitudes ambientalmente positivas. O que se verifica é que, quer em investigação quer mesmo ao nível dos programas de mudança comportamental e educação ambiental, procuram-se identificar todos os factores possíveis que podem estar na base de um comportamento. Isto tem implicado a tentativa de juntar vários níveis de explicação - económicos, políticos, estruturais, demográficos, etc. - num mesmo modelo explicativo do comportamento ambiental ou de consumo (e.g. água ou energia), o que é criticável, pois tem tido como consequência um frequente esquecimento de um nível de explicação psicológico. Um segundo aspecto a criticar, refere-se ao facto de que os modelos que integram os factores psicológicos, são na sua maioria de carácter descritivo e não explicativo e restringem-se a uma "análise positiva" dos factores de consistência (e.g.: Teoria do Comportamento Planeado de Ajzen (1991); Modelo Normas-Crenças-Valores de Stern, Dietz, Abel, Guagno & Kalof (1999)). Um terceiro e último aspecto criticável, advém do facto de estes mesmos modelos de comportamento darem em geral demasiado ênfase ao aspecto deliberativo/intencional e

subestimarem o poder dos processos automáticos que não envolvam mediação consciente (Bargh & Chartrand, 1999). Estas três razões globais poderão explicar em grande parte porque é que a investigação em Psicologia do Ambiente e do Consumo, continua a não responder à pergunta: porque é que as pessoas falham em agir da forma que seria desejado socialmente? Ou de outra forma: *quais as barreiras e constrangimentos à realização de comportamentos pro-ambientais?*

Neste âmbito, o objectivo das investigações realizadas foi procurar responder às três críticas identificadas e à pergunta de quais as barreiras e constrangimentos à realização de comportamentos pro-ambientais. Para isso, foi estudada uma das barreiras psicológicas à consistência atitude-comportamento e à promoção do consumo de produtos ecológicos, em particular ou de novos produtos, em geral: o hábito. Este factor de inconsistência pode ser definido como: comportamento automático guiado por objectivos, sendo representado mentalmente por uma associação cognitiva "objectivo comportamental-acção", que pode ser activada a partir de pistas contextuais (e.g. Aarts, Verplanken & van Knippenberg 1998; Aarts & Dijksterhuis, 2000). Outras concepções de hábito (e.g. Wood & Neal, 2007) consideram que o efeito da activação destes não se realiza com mediação de objectivos comportamentais. No entanto, ambas as perspectivas consideram a importância destes objectivos na sua activação e caracterizam os hábitos como representações mentais. Sendo os hábitos representações mentais, alguns autores consideram-nos como equivalentes a outros tipos de representações mentais como os estereótipos e atitudes por exemplo, envolvendo processos cognitivos semelhantes (Aarts & Dijksterhuis, 2000). Neste sentido, também partilham algumas das características destes, nomeadamente o facto de serem representações dinâmicas cujos efeitos resultam da interacção entre o contexto e os processos cognitivos. Tendo em conta isto, pretendemos ir para além de conceptualizações clássicas dos hábitos, enquanto simples respostas S-R, que não conseguem resistir a mudanças do contexto. Estas

levam frequentemente a que o seu efeito enquanto barreira à promoção da compra de novos produtos e especificamente de produtos ecológicos (e.g. produtos de produção biológica) seja subestimado. Para isso, baseámo-nos nos pressupostos da Teoria dos Sistemas de Objectivos (Kruglanski et al., 2002) e nas regras de activação de constructos mentais (Higgins, 1996; Higgins & Brendl, 1995), ao considerar que as decisões podem ser influenciadas pelos hábitos com base numa interacção entre 2 fontes de activação: aplicabilidade ao contexto - manipulada em termos da familiaridade dos meios para alcançar o objectivo comportamental mentalmente representado - e acessibilidade cognitiva do objectivo comportamental associado - quer por primação supraliminal, quer por cronicidade. Esta demonstração foi feita com base na manipulação destes aspectos num conjunto de estudos experimentais pela internet envolvendo a escolha de produtos em simulações de compra de produtos biológicos vs. não biológicos - na mesma categoria de produto habitual (leite; fruta) - e habituais vs. não habituais - em categorias de produto diferentes (leite vs. sumo de laranja). Os resultados demonstram um efeito de aplicabilidade percebida - percepção da aplicabilidade do hábito aos meios existentes - com mais produtos habituais (estudos 2 e 3), ou mais produtos não biológicos (estudo 1), escolhidos num contexto familiar comparado com um novo. Mais ainda, verifica-se uma maior consistência na escolha de produtos não biológicos perante 3 escolhas de produtos na mesma lista (estudo 1). No que se refere à acessibilidade, verifica-se que participantes com hábito forte – i.e., com elevada acessibilidade "natural" ou cronicidade do objectivo de compra habitual - escolheram consistentemente o produto habitual mesmo em situação de mudança de contexto, isto é, perante um contexto familiar vs. novo (estudo 2). No que se refere à primação supraliminal do objectivo comportamental, foi realizada uma tarefa de simulação e descrição comportamental numa certa situação de compra com um objectivo comportamental associado a ela (e.g. comprar leite para os pequenos-almoços da semana, numa condição de activação do objectivo alvo, correspondente à tarefa de tomada de decisão

posterior). Esta manipulação anterior à decisão na tarefa de escolha dos produtos pela internet, não apresenta o efeito esperado (estudo 2) mesmo quando esta manipulação supraliminal ocorre de forma visual (estudo 3), podendo num caso indicar a presença de efeitos de contraste e/ou de supressão da activação do objectivo (estudo 2), e noutro uma falha na metodologia usada (estudo 3).

Por último, foram também realizados estudos (estudo 4 e 5a+5b) em que se procurou avaliar o efeito do desenvolvimento de intenções de implementação (Gollwitzer, 1999). Segundo a literatura, o desenvolvimento de "intenções de implementação" associadas a um certo objectivo X, são eficazes em mudar comportamentos desempenhados habitualmente com um objectivo Y (Aarts, Dijksterhuis & Midden, 1999). Estas intenções envolvem um planeamento comportamental em termos de: "quando a situação Z surgir, vou desempenhar a resposta X", especificando o "quando", "onde" e "como" essa resposta vai permitir alcançar o objectivo (Gollwitzer, 1999). No entanto, enquanto a mudança de comportamento com base no desenvolvimento destas não se torna estável, a sua eficácia continua dependente da estabilidade do contexto entre outras condições (Verplanken & Faes, 1999). Tendo em conta a ausência de estudos a este nível, procurámos avaliar o efeito do hábito enquanto promotor de instabilidade no processo mediado pela consciência, reduzindo o sucesso das intenções de implementação. No caso dos nossos estudos, o desenvolvimento de intenções de implementação referiu-se ao planeamento da compra de produtos biológicos em geral (objectivo comportamental abstracto) ou especificamente para a compra de fruta de agricultura biológica (objectivo comportamental concreto), em ambos os casos referente à compra na semana seguinte. Neste sentido, os resultados demonstraram que os hábitos podem "quebrar" as intenções de implementação, mesmo num contexto novo e menos facilitador (menos familiar) dos hábitos (estudo 4). Por outro lado, também demonstraram que enquanto em certas condições os hábitos conseguem resistir ao efeito de intenções de implementação,

noutras podem ser “quebrados” consoante as alterações ao contexto e as alterações cognitivas induzidas pelo desenvolvimento destas (estudo 5a e 5b).

Concluindo, os estudos apresentados nesta tese levantam algumas questões importantes acerca das pré-condições para que um hábito influencie a tomada de decisão face à escolha de produtos biológicos vs. não biológicos, ou habituais vs. não habituais, com base na interacção de factores internos e características situacionais. Como tal, de forma a modificar um hábito bem estabelecido e impedir que ele influencie negativamente as decisões e comportamentos e/ou desenvolver “bons hábitos”, as pessoas necessitam de investir num esforço de auto-regulação elevado, de forma a resistir às tentações de se tornarem “presas” de hábitos indesejados. Neste âmbito, a literatura parece exageradamente optimista relativamente ao sucesso das intenções de implementação e ao efeito negativo dos hábitos. No entanto, ao identificar os factores que podem influenciar negativamente os comportamentos e decisões, os estudos aqui apresentados, apesar de parecerem dar uma visão pessimista são na realidade optimistas.

Palavras-chave: Comportamento ambiental; Consumo; Barreiras e constrangimentos; hábitos.

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Chapter 1

WHY DO PEOPLE FAIL TO ACT? BARRIERS AND CONSTRAINTS ON PROENVIRONMENTAL BEHAVIORS

THE POSITIVITY FALACY

Being “positive” in life is not always a good thing, especially if you work in the field of Environmental Education and Behavior Change. Many projects in this area are biased by a “positivity fallacy”, i.e., the belief that as long as people develop the right attitudes, intentions, skills, information, etc., the right proenvironmental behavior should follow. However, as informed by the social sciences literature, an inconsistency exists between attitudes and behaviors, with cross-country studies showing high levels of environmental concern but, at the same time, low levels of environmental action (see e.g. Ferreira Marques, Palma-Oliveira, Marques, & Ferreira 1995). A classical example of this in the environmental domain was given in Geller’s study (1981), in which householders changed significantly their attitudes and increased their knowledge regarding residential energy conservation measures following participation in an intensive workshop (three hours) about this subject; but not their behaviors, as the results of visits by technicians to their houses demonstrated.

This attitude-behavior inconsistency is not a new subject, having been studied in Social Psychology for more than 50 years although being scarcely applied to environmental behavior analysis in general and Environmental Psychology in particular. In our view, one of the causes of such inconsistency is an underestimation of the factors working as barriers and constraints to environmental behavior change and to the promotion of proenvironmental behavioral goals (i.e., factors which increase the attitude-behavior inconsistency). Hence, the “right” factors do not seem to be enough to promote behaviors consistent with one’s positive attitudes, beliefs, etc. In the field of environmental behavior this inconsistency reflects a conflict between proenvironmental behavioral goals (e.g. associated with the intention to buy organic food) based on positive attitudes, intentions, etc. and anti-environmental behavioral goals (e.g., associated with non-organic food buying habits).

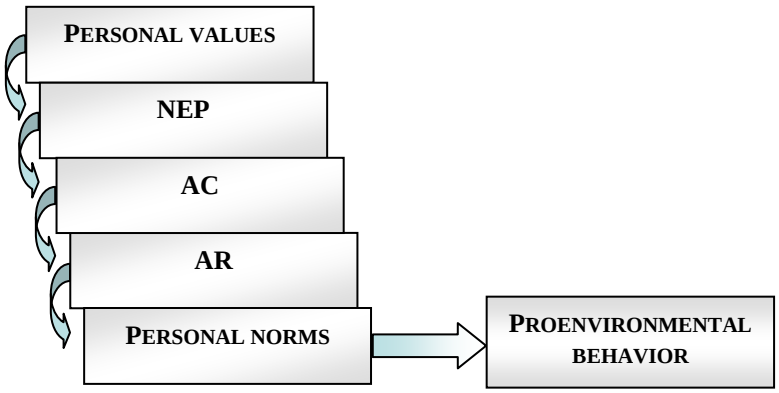
Although this conflict sometimes appears to be won in the short-run through behavioral and attitude change programs, it is actually being lost in the long-run (Gaspar de Carvalho & Palma-Oliveira, 2007). This occurs because many of these programs underestimate the factors that can work as barriers and constraints to environmental behavior change and the promotion of proenvironmental behavioral goals, i.e., factors which increase the environmental attitude-behavior inconsistency. Thus, the "right" factors don't seem to be enough to promote behaviors consistent with one's positive attitudes, beliefs, etc. if we do not take into account the former. This is also related with the fact that, independently of the way we conceptualize proenvironmental behavior (Corral-Verdugo & Pinheiro, 2004) this behavior is usually defined as involving intention, planning and deliberation. One example is given by Corral-Verdugo (2001; p. 37) who defines it as "a set of deliberate and effective actions which respond to social and individual requirements and result in protection of the environment". Although we agree with this definition, it should be taken into consideration that there can be various factors that can inhibit or interfere with this intention, planning and deliberation and thus, promote a behavior that is inconsistent with these. We will get back to these factors later on.

This "positivity fallacy" is also evident in research on environmental behavior regarding models that intend to identify the "positive determinants" of action (i.e., factors that when present can promote a new behavior or increase the strength of an existing one.) Consequently, the barriers and constraints to proenvironmental behaviors are seen as *lacking factors*, i.e., factors that influence proenvironmental behavior in a negative way, due to absence or weak influence of a positive determinant or "right" factor. These factors influence proenvironmental behavior in a negative way (and thus increase the attitude-behavior inconsistency), due to the absence or weak influence of a positive determinant or "right" factor. For example, imagine someone who does not have the skill and behavioral

information on how to assemble energy or water efficient equipment and/or his family and relevant peers are not supportive of that behavior. In this case, the likelihood of development and maintenance of conservation behavior will be low.

One example comes from the Value-Belief-Norm Model (Stern, Dietz, Abel, Guagno & Kalof, 1999) as shown in a simplified version in Figure 1. This model considers that environmental behavior is caused by a chain of 5 types of variables: personal values (most importantly the altruistic ones); ecocentric orientation towards nature (NEP); awareness of the behavioral consequences over the environment (AC); attribution of responsibility to self (AR; based on beliefs regarding environmental conditions); and personal norms (in the sense of a personal responsibility to behave in a certain way). From this model it is implicit that, if people lack altruistic personal values or an ecocentric orientation towards nature, proenvironmental behavior should not occur.

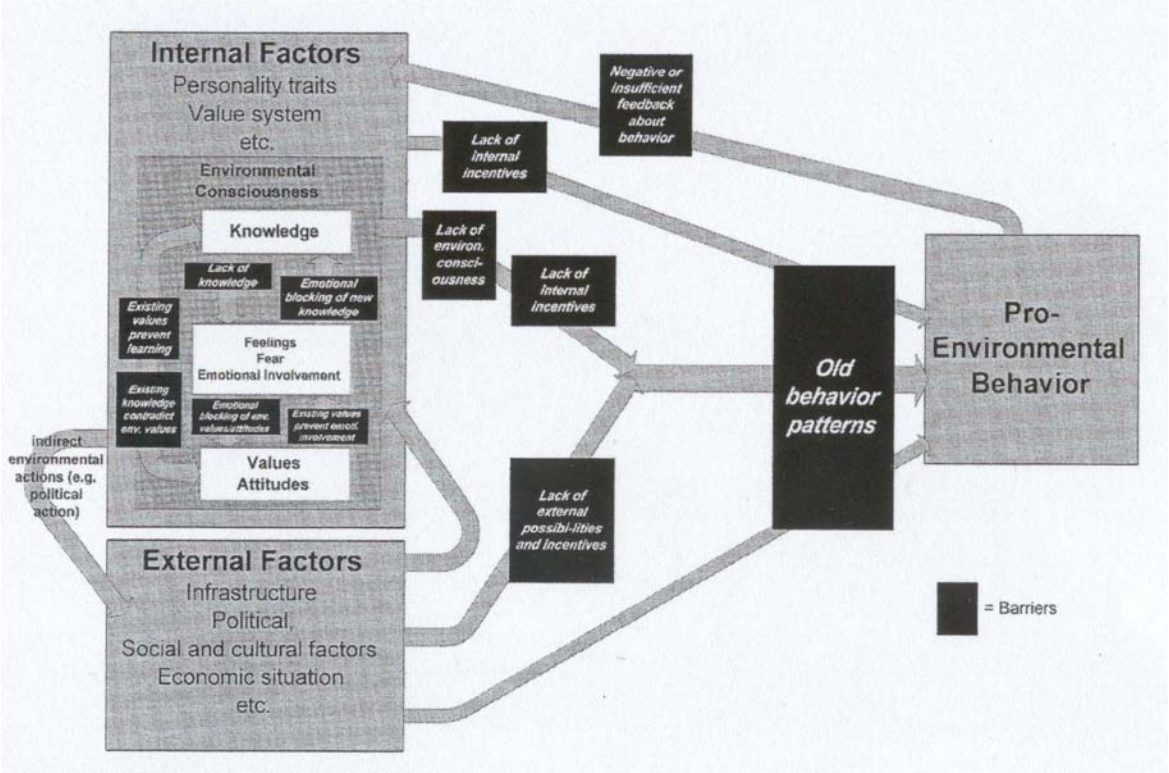
Figure 1. Value-Belief-Norm Model (adapted from Stern et al., 1999).



Other models are more explicit regarding these negative factors, as it is the case of Kollmuss and Agyeman's model (2002), shown in Figure 2, which is also based on a "positivity fallacy" with the majority of the factors that can influence behavior in a negative way being what we call *lacking factors*: lack of internal incentives, lack of environmental consciousness, lack of external possibilities and incentives and negative or insufficient

feedback about behavior. One exception to this is the factor that the authors call “old behavior patterns” (Kollmuss & Agyeman, 2002).~

Figure 2. Proenvironmental behavior model (Kollmuss & Agyeman, 2002).



These types of models are based on a view of behavior determined mainly by dispositional factors, disregarding the effect of context in it, viewed in a psychological level of explanation (i.e., context is viewed in terms of a political, social, economical, etc., level of explanation). This represents a *fundamental attribution error*, given that behavior is considered to be caused by individual characteristics and dispositions, when it can also be caused by aspects of the situation or context where behavior is supposed to take place (Palma-Oliveira & Gaspar-Carvalho, 2004). Unfortunately, despite of research in other areas showing the influence of context (e.g. Social Psychology), this view is still disseminated nowadays in research on environmental behavior. One example is the work done in Europe on Environmental Psychology and specifically in Spain. Accordingly, a meta-analysis

performed by Amérigo (2006), showed that most of the work done in the last fifteen years regarding environmental behavior identified mainly attitudinal variables - general and specific attitudes, beliefs and values – as predictors of environmental behavior, and more frequently, as predictors of intention to perform proenvironmental behaviors. Also, most of the methodology tries to establish relations between the various predictors and intention and behavior, and rarely try to present a process view of this, or include contextual factors in a psychological level of explanation.

This tendency in research has also manifested itself in other regions of the world (see e.g. Pinheiro & Corral-Verdugo, 2007), and it still reinforces a problem which is failing in acknowledging the fact that people's behavior is influenced by situations and thus, prevents research being done regarding this. In fact, even if people have a strong intention to behave in a proenvironmental way, the situation can be perceived as inhibitive (Corraliza & Berenguer, 2000), leading to inaction, which can cause a conflict between proenvironmental and anti-environmental behavioral goals. Also, even if a certain person is altruistic, this altruism can be constrained if this person is in a situation where the egoistic/competitive behavioral options are more accessible and there is an environmental and social uncertainty, regarding the amount of resource available and the number of people behaving in a competitive or cooperative way, respectively (Palma-Oliveira & Gaspar de Carvalho, 2004). In this sense, models and projects based on a "positivity fallacy" only identify "what people are supposed to do" given the right factors – prescriptive view - but not "what people actually do" when they are in a certain situation – descriptive view. Therefore, we are interested in the reasons why Environmental Education and Behavior Change projects aren't being successful in promoting proenvironmental behaviors (which are expected to be consistent with people's positive environmental attitudes) and in changing anti-environmental behaviors; we are also interested in knowing the situation's role in this. Identifying "what people actually do"

implies identifying the reasons why people fail to act proenvironmentally, being this the aim of this chapter.

THE NEED FOR A MORE INTEGRAL ANALYSIS OF BEHAVIOR

A number of behavioral models in the literature on environmental behavior try to explain why people fail to act. However, most of the negative factors analyzed so far are non-psychological in nature (e.g. socio-economic). These factors are seen as having their influence outside the person's intention or will and are represented as a direct effect of situations on people's behavior. Thus, no matter how strong the commitment to perform a behavior is, how positive the environmental attitude is, or how responsible a person feels in its performance, the situation can directly inhibit behavior.

One example, presented in the literature as a situational barrier to recycling behavior, is garbage-containers spatial accessibility (Schultz, Oskamp & Mainieri, 1995). The less spatially accessible (i.e., the more distant) the waste disposal facilities are, the lower the probability that people will separate at home and dispose the waste in the right recycling bins. This problem appears to be more related to design and urban planning issues than to people's "fault" and can be labeled as a "blame it on the situation" effect, as manifested in the literature regarding environmental behavior. In addition, this approach does not explain why when people's personal dispositions and the situation are both facilitative (e.g. spatially accessible containers + positive attitudes and intentions; etc.), people still do not behave in the "right way." Also, it also doesn't explain proenvironmental behavior performance even when the context is difficult and inhibitive. Thus, the approach provides an incomplete account of the interaction between situations and psychological processes.

Additional examples pertaining the negative effect of situations on proenvironmental behavior are the influence of exterior temperature on domestic energy consumption levels

(Olsen, 1981); the inadequacy of infra-structures, like ergonomic features and transportation network planning, on different environmental behaviors (Kollmuss & Agyeman, 2002); the influence of place of residence and other demographic variables on driving behavior (e.g. Tanner, 1999); and the absence of income on purchasing energy-efficient devices (Constanzo, Archer, Aronson & Pettigrew, 1986). These factors correspond to levels of explanation from disciplines other than psychology (economy, sociology, architecture, etc.) and thus the situation's effect on behavior is not assessed within a psychological level of explanation. Our criticism is not intended to imply that non-psychological factors and psychological variables should not be assessed together when an attitude-and-behavior-change intervention is designed. In fact, we consider that models with various levels of explanation can be important in certain behavior change interventions and in some areas of research. What we alert is that by assessing only these non-psychological factors, researchers and practitioners are often prevented from seeing them through a "psychological lens" (as lay people usually do) and implicitly dismiss their importance and explanatory power. This has prevented the development of psychological models given that when a factor is identified in a certain level of explanation, it won't be identified again within a psychological explanatory view. Therefore, identifying the reason for not separating for recycling as due to the waste disposal facilities distance, prevents for example of being seem as due to a perception of incommodity, time spent and metal effort in acting or even a "less visible" explanation regarding a low cognitive accessibility of the behavioral options, associated with the visual absence of the facilities (see e.g.: Biel & Garling, 1995, for a related example).

One illustration of this mixed explanation levels models comes from Gardner and Stern's (2002; Stern & Oskamp, 1987) Model of Resource Consumption Behavior. These authors identify internal and external psychological and non-psychological "limiting factors" which prevent people from acting based on their proenvironmental attitudes. Such factors are

classified ranging from the highest level of causality (variables with the strongest influence on behavior) to the lowest, respectively: 1) resource-use or resource-saving behavior; 2) attention, and behavioral commitment; 3) knowledge; 4) attitudes and beliefs; 5) values and worldviews; 6) external incentives and constraints; and 7) household background. External and internal barriers can be found within these levels, with their influence being higher for high-cost or difficult actions (i.e., stronger influence as attitude-behavior inconsistency factors). Thus, for example, an inconsistency between attitudes (level 4) and behavior (level 1) could be due to internal barriers like absence of the necessary behavioral knowledge (level 3) or the absence of either attention or behavioral commitment (level 2). In opposition, the influence of external barriers is higher on household background (7) and external incentives and constraints (6) levels, which can inhibit the development of positive values and worldviews (level 5), and both attitudes and beliefs (level 4). According to Gardner and Stern (2002), these external barriers can be associated with people's socioeconomic background, available technology, economic forces, inconvenience, etc.

The problem with this "blame it on the situation" effect is evident in these models that try to integrate non-psychological factors into psychological models and into projects that take them into consideration. As we said, by including non-psychological factors, their effect over the psychological processes is not explained since it is inferred that they have a direct effect on behavior. Thus, more than identifying all the possible psychological and non-psychological explanatory factors and how they *independently* affect behavior (what could be called the "big bag" models), we psychological researchers should consider their effect as operating in a synergistic way and develop more psychological models within environmental behavior research. In other words, we should analyze how situations and psychological processes interact with each other to influence behaviors, in order to increase the models' explanatory power. Some examples of this are provided next.

Consider again the garbage containers accessibility example given before. Often, the low percentage of separation for recycling in a certain neighborhood is attributed to design and urban planning issues like for example the garbage containers low spatial accessibility, either by people who live there ("it is too far away from my house") or by the local authorities ("we need to increase the number of waste disposal facilities"). However, frequently this works more as a post-hoc justification given by people for not behaving in the way they are supposed to (and according to their own positive attitudes) than actually as the real cause of their proenvironmental behavior absence. There can be many explanations for this misattribution of the causes of their behaviors, such as for example: people "have limited introspective access to the causes and processes of their habits" (Aarts & Custers, 2009; p. 24) and attribute behavior to the "visible" causes (in this case, spatial accessibility); people attribute socially undesirable behavior to external causes (external *locus* of control) instead to their dispositions, in order to maintain cognitive consonance; or other reasons. Still, this would be a subject for a chapter on its own and we won't develop it here.

The main idea here is that these "visible" non-psychological factors are often seen as the causes of behavior and thus, a direct link between the former and the latter is acknowledge, without the mediation of psychological processes. Beyond the scientific reasons to argue against or in favor of psychologically mediated or unmediated processes, this discussion goes deeper into a more philosophical discussion, between ecological realism – the "unmediated detection of information" - and cognitive constructivism – "perceptual processing which involves inductive inference or intelligent problem solving" (Kubovy, Epstein & Gepshtein, 2003; p. 87, 88).

Accordingly, most of the reasons given in the literature and the findings from attitude-behavior change programs, consider that the reasons why people don't behave the way they are supposed to, come from the so-called objective and tangible factors such as: climate's influence over conservation behaviors (energy and water, for example); income's influence over transportation behavior, installation of energy and water saving devices, organic products buying, etc.; lack of availability of waste disposal facilities; and others.

As we said before, these factors can sometimes work as post-hoc (perceived) justifications for behaving in a certain way. Other times, they only have an effect over behavior when mediated by perception. An example of this was given by Talarowsky (1982) in a study on water conservation during a drought situation. This study showed that when residents considered that the drought was due to environmental reasons, they tended to conserve water within the limits proposed by the authorities. However, when they thought that individual consumption was the cause of water scarcity, the limits on consumption average were exceeded. This probably implied a belief such as: "(...) if the crisis is due to other people's behavior, then my behavior will not alter much the situation and it is better to continue using water because if I don't, others will do it in my place" (Palma-Oliveira & Gaspar de Carvalho, 2004, p.5; Palma-Oliveira & Correia dos Santos, 1998). On the other hand, the perception of water abundance (as opposed to draught) inhibits water consumption reduction behaviors (Corral-Verdugo, 2002), which can imply a biased perception of environmental behavior consequences such as: "if water is abundant then there's no need to reduce my consumption because it won't have consequences on its depletion".

Following from this, our argument is that the non-psychological behavioral barriers and constraints identified in the literature and in many projects (see e.g. McKenzie-Mohr & Smith, 1999) can also be seen in a psychological level of explanation, because most of them

involve a perceptual component[1]. Accordingly, one of the main principles of psychology explaining how people interact with their environment is that we are the "builders" of our own reality (Smith & Mackie, 1995). People can construct their own reality through social and cognitive processes, which means that many of the factors that are considered to be non-psychological can be reanalyzed as psychological. Thus, some aspects of people's environment can work as a behavioral barrier if people perceived them in that way. In other words, the limiting non-psychological factors (Gardner & Stern, 2002) present in the situation can have their effect on behavior mediated by perceptually-based processes, translated into an interaction between psychological factors (e.g. attitudes and beliefs) and the situation. Thus, the existence of the object is not only important (ecological realism) but also how we perceive it (cognitive constructivism), whit this latter view still lacking importance in ecological behavior research.

BARRIERS AND CONSTRAINTS ON ENVIRONMENTAL BEHAVIOR

PERCEPTION BASED FACTORS

Situational factors negatively affecting behavior through the mediation of perceptual processes are called *perceived barriers and constraints* (Gaspar de Carvalho, 2004). They can be considered "true" negative determinants of action, since they do not correspond to an absence or weak influence of a positive determinant.

In the example given, regarding the garbage containers accessibility, the psychological barrier in this case can be for example the perceived cost and difficulty in performing the behavior. In fact, performing or not behavior in this situation might depend more on the

[1] By this we don't mean that every barrier and constraint should involve a perceptual component given that, as we will show later on, some of them don't.

person's assessment of the costs and benefits that might result from it (in terms of the mental effort, time, motivation level and degree of incommodity in the performance of behavior; Gaspar de Carvalho & Palma-Oliveira, 2004; Kollmuss & Agyeman, 2002), with the spatial inaccessibility working more as a post-hoc justification for not behaving. A study by Diekmann and Preisendörfer (1992; as cited in Kollmuss & Agyeman, 2002) supports this idea, showing that small-effort behaviors like recycling are performed more frequently than large-effort behaviors like car use reduction, with this difference being attributed to the perceived costs vs. benefits.

Another example comes from the Theory of Planned Behavior (Ajzen, 1991), which apart from analyzing two positive behavioral determinants (attitude and subjective norm), identifies a process which is similar to the costs/benefits analysis, named "perceived behavioral control" (PBC; Ajzen, 1991). The idea is that since there are many behavioral constraints that may limit volitional control, it is useful to analyze people's perception of these constraints, which serves as a "proxy" for actual control of their behavior, to the extent that these perceptions are close to reality (Ajzen, 2002). Hence, a low PBC functions as a negative determinant because the individual can perceive that behavior is not under her/his control and that there are strong external constraints impeding its performance, decreasing the intention to perform it. Other studies in Environmental Psychology use similar concepts, like for example, perceived behavioral barriers (Mckenzie-Mohr, 2000), perceived behavioral costs (Kollmuss & Agyeman, 2002) or perceived difficulty (De Young, 1988-1989). These perceptions can be seen as a product of expectancy or perceived likelihood of reaching a goal (e.g. "How likely is that I separate residues at home?") and goal value (e.g. "How important is for me to separate residues at home?") (Förster, Liberman & Friedman, 2007).

Apart from the expectancy/value assessments, other types of perceptions of the situation can also exist, which can be considered *perceived barriers and constraints*. Accordingly, this

category can also include what some authors call *subjective barriers* (Tanner, 1999) given that although they are based on objective situational characteristics, they can be biased perceptions of them, due for example to the influence of beliefs. Thus, imagine someone who has a belief that the water scarcity problem resolution depends on technology and that someday a successful and non-expensive way to use water from glaciers, atmosphere or another source will be found. Beliefs like this, that according to Thompson and Barton (1994) are based on an anthropocentric orientation, will function as limiting factors to save water because these individuals will expect environmental problems to be solved through technological improvements and not through individual and societal behavioral change. If you add to this a belief that, in spite of what is said everywhere on the news about the world situation, water is an abundant resource (overestimation of the resource level due to the uncertainty in this regard; Biel & Garling, 1995) because at least you have no problem in your city due to a dam that provides more than enough water for personal and public use, the necessity of water conservation will be minimized and underestimated (see Corral-Verdugo, 2002).

Another type of perceived barriers and constraints refers to perceptions about the self and one's own behaviors. In this regard, research has shown that the tendency to break social norms, or antisocial behavior (conceptualized in terms of the perception of how frequently people engage in antisocial actions), can inhibit water conservation. Anti-environmental behavior can be seen as an instance of more general antisocial behavior (Corral-Verdugo & Frías-Armenta, 2006; Corral-Verdugo, Frias-Amenta, Gonzalez-Lomelí, 2003). Also, we can include the perceptions regarding other people, translated into the influence of explicit cognitive representations working as perceived barriers and constraints, such as: stereotypes regarding environmentalists (Stoll-Kleemann, 2001), attitudinal ambivalence (Costarelli &

Colloca, 2004), anti-environmental subjective norms (Schultz *et al.*, 1995) or anti-environmental attitudes (Palma-Oliveira & Garcia-Marques, 1988).

As a conclusion, we can see that perception-based factors are important because by analyzing them we can identify the underlying factors characterizing a certain context and behavior (Suárez, 1998). Moreover, there is idiosyncrasy in these factors, since what might be a barrier for one person might not be for another. Consequently, different perceptions might imply different interventions to change attitudes and behaviors and they should be assessed.

These perceptions do not occur in a situational void and even when they are biased in some way, they are still associated with one or more situationally perceived characteristics (e.g. recycling behaviors of relevant people; availability and price of organic products in a supermarket shelve; location of a garbage disposal facility; amount of litter in a public space, etc.). We perceive these situational characteristics in a broad way from the most concrete to the most abstract levels, including not only the perception of context's physical features and tangible aspects but also those characteristics associated with social environments and events happening in there, like other people's behaviors and attitudes. By identifying these perceived barriers and constraints, we try to bring the situation back to the study of barriers and constraints on environmental behavior, yet within a psychological level of explanation. Thus, by identifying these perceived barriers and constraints, we try to "bring back" the situation to the study of the barriers and constraints on environmental behavior, but within a psychological level of explanation. This view can be seen as close to an ecological perspective of behavior (Barker, 1968), which we also follow given that we consider that different contexts imply different behaviors. Differently, we also consider that these perceptions can vary from person to person and from groups to groups (Smith & Mackie, 1995).

Still, there is a problem in considering only these types of perception based factors since the context can also inhibit or constrain people's behavior, outside their awareness and conscious control. This effect is inaccessible to traditional perception based measurement techniques (e.g. questionnaires) and thus, the associated barriers and constraints are not identified and dealt with in attitude and behavior change programs. This is a subject to which we will get back later on.

MODELS OF BARRIERS AND CONSTRAINTS ON ENVIRONMENTAL BEHAVIOR

Before, we presented models that try to identify the *lacking factors* and the non-psychological factors which might limit proenvironmental behavior (e.g. Gardner & Stern, 2002; Kollmuss & Agyeman, 2002). The literature also presents models that, although still including some non-psychological factors without redefining them as psychological (considering them independent from human perception), nonetheless they represent an evolution compared to the ones presented before. This is because they explicitly consider the influence of the *perceived barriers and constraints* and can therefore be included in a behavioral analysis that considers the negative determinants. Accordingly, they go beyond the "positivity fallacy" based on *lacking factors* and present a situational-individual approach of factors that have a negative influence on environmental behavior, independent from the former.

An example of a model that acknowledges the influence of the situation as mentioned, is provided by Tanner (1999) based on the Ipsative Theory of Behavior (e.g. Frey, 1989; cited by Tanner (1999)). Although still including some non-psychological factors (the "objective constraints") it represents an evolution compared to the previous examples, because it goes beyond the "positivity fallacy" and explicitly considers an analysis of proenvironmental behavior negative determinants based on the situation. According to this author, there are

three classes of constraints, which are conceived as internal and external conditions inhibiting the performance of an action: 1) Ipsative constraints – internal factors that prevent the activation of a particular behavioral alternative from occurring, i.e., the action can only be performed if the individual remembers to perform it, implying the assessment of a limited number of alternatives and without considering the proenvironmental option in them; 2) Subjective constraints – perceived factors that inhibit preference for a particular behavioral alternative or willingness to act; these constraints entail beliefs of what is possible or not, desired or not, or allowed or not, so that they can eliminate behavioral options based on that assessment; 3) Objective constraints – external factors that prevent the performance of a particular behavior alternative from occurring, which are independent from individuals' perception (lack of opportunities, mental and physical disabilities; low income; influence of legal and political institutions; etc.).

To support this perspective, Tanner (1999) analyzed the influence on driving behavior of two subjective constraints namely "sense of responsibility" and "perceived behavioral barriers" along with a set of objective constraints, based on socio-demographic and contextual characteristics like "availability of an automobile" and "place of residence" (viewed as non-psychological or "objective" factors). It was shown that these factors can work as barriers and contributed to the explained variance in the behavioral reports of driving behavior frequency. However, as we argued before, what they call "objective" barriers can be viewed as psychological in nature, since some behavioral barriers only exist if people perceive then as barriers. For a certain person, not owing a car might be perceived as a barrier to use a car to go to work but for another person, this is not a barrier since he or she can engage in "car pooling" or even rent a car when he or she needs one.

Models like the Ipsative Theory of behavior are good in the sense that, instead of trying to present all the possible factors that might influence behavior ("big bag" models) they

actually try to explain the different types of factors affecting behavior (subjective, objective and ipsative constraints). As a result, they are closer to a process analysis of behavior, which is lacking in the literature and consequently, is also not being used in practice. Nonetheless, they commit the same mistake as the other examples presented before, because by trying to integrate the objective (i.e., non-psychological) and perceived (i.e., psychological) factors they are considering factors in different levels of explanation (socio-economic, architectural, demographic, etc.) and not taking into consideration the social construction of reality (Smith & Mackie, 1995).

A good example of an interactionist situational-based approach that tried to overcome this critic was put forward by Kaiser and Keller (2001). They used a confirmatory application of the Mixed Rasch Model, a statistical model used in this case to assess the behavioral consequences of exposure to certain environments. For this they included a measure of behavior difficulty not based on self-reports but as function of the number of people who perform the environmental behavior in a certain way. Thus, the fewer the people who perform the behavior, the more difficult the behavior is and the lower the probability that a person will behave in accordance to those people, independently of her own general environmental behavior. Given this, they used a systematic analysis of the differential behavior difficulties by applying a Mixed Rasch Model to compare similar "latent" groups of people on endorsement probabilities associated with environmental behavior (for an extended explanation of the method see Kaiser & Keller, 2001). Thus, differences across similar samples representing different environments should be attributed to those environments. Accordingly, they found that different living contexts, i.e., rural and urban, yielded different endorsement probabilities associated with environmental behavior that in this study's case could be due to consequences of the environment on peoples transport behavior associated with different modes of transportation, particular opportunities and social climates.

The problem with this approach is that it represents a descriptive approach and as the authors recognized, the primary goal was to "detect and validate the significance of the environment (…) in effectively constraining and facilitating certain ecological behaviors" (Kaiser & Keller, 2001; pg. 213), which still does not explain how the situation can affect behavior, through the mediation of psychological processes. Moreover, although this methodological approach is adequate in the sense that goes beyond the problems and measurement error introduced by behavioral measures through self-reports, it only allows the analysis of *perceived barriers and constraints*, i.e., differences in the environments that are related to how people perceive differences in their characteristics (e.g. modes of transportation, particular opportunities and social climates).

These two examples are mainly descriptive and do not explain how the situation can affect behavior through the mediation of psychological processes. Nevertheless, they consider some "invisible" factors scarcely identified in research (ipsative constraints; Tanner, 1999; implicit situational factors; Kaiser & Keller, 2001), which should be more profoundly studied. This study should be complemented with a process view, to understand how contexts can inhibit or constrain people's behavior, outside their awareness and conscious control.

THE "INVISIBLE" FACTORS

Studying only the *perceived barriers and constraints* is not enough. While the study of these "visible" factors is important, other psychological factors that can be as powerful as or stronger than them, remain unconscious and inaccessible to traditional measurement techniques (e.g. questionnaire), working as "invisible" factors. Accordingly, the situations effect on behavior can be mediated not only by perception based processes but also by cognitive processes of which people are not aware of, which can work as *unconscious*

barriers and constraints. Moreover, the *perceived barriers and constraints* can be influenced by these, which is a subject we will get back to later on.

Not including these "invisible" psychological factors might be one of the reasons why many behavioral change projects are not successful, since these "invisible" factors remain that way and are not analyzed and dealt with. The problem is that, as Gardner and Stern (2002; p. 160) stated: "the limiting factors for behavior change need to be diagnosed, not presumed" and a more integral behavioral analysis of barriers and constraints to environmental behavior should therefore include them.

Although many models and projects take into consideration perception based factors (resulting from processes of which people are aware of), there is still not enough evidence to support the widespread view that conscious mediation "is the rule rather than the exception" (Bargh, 1997, p.5). Accordingly, since the 1960s research in social psychology has increasingly demonstrated the relative automaticity of social behavior and the influence of cognitive and motivational factors outside people's awareness on behavior (Bargh, 1997). These factors are rarely considered in Environmental Education and Behavior Change projects and in models of barriers and constraints on environmental behavior and when they are, they are not explicitly identified as such. Therefore, we will now analyze the cognitive processes that underlie the development of *unconscious barriers and constraints*.

To be clear on how the automatic processes can have their effect, it is important to understand first what we mean by automatic (spontaneous) and conscious (deliberative) processes and the differences in the way they are initiated and can influence social behavior. Conscious processes are mental acts of which we are aware, that are intentional, effortful and controllable (Bargh & Chartrand, 1999). In a different way, for a process to be automatic, it has to be effortless and happen when a set of preconditions are in place (conditional automaticity), without any conscious choice or guidance from that point on (Bargh, 1997).

Regarding this, we specifically consider the goal-dependent automaticity and its influence on social behavior, with goal being defined as "an internal representation of a desired state, such as a behavior or outcome (Aarts & Custers, 2009). This type of automaticity requires an initial past or present intention or act of will for a goal to be activated (Bargh & Chartrand, 1999). Therefore, it corresponds to the type of behavioral goals that Environmental Education and Behavior Change projects try to promote (e.g. to activate the goal to "separate residues at home" we need first to "intend" to do it, i.e., develop a goal-intention).

Hence, the category of unconscious barriers and constraints can include cognitive representations of the world (e.g. attitudes), which can increase the probability of anti-environmental behaviors to occur in an automatic and unintended way, given the presence of certain environmental cues. These barriers/constraints produce their effect without people being aware of them and can influence across different contexts and behaviors (i.e., they are "universal"), as long as the activating cues are stable across those contexts and behaviors. The same does not happen with perceived barriers and constraints, which often are behavior or domain specific and idiosyncratic (e.g. Black, Stern & Elworth, 1985; McKenzie-Mohr & Smith, 1999).

One example of *unconscious barriers and constraints* refers to the influence of implicit anti-environmental attitudes over environmental behaviors, with research showing that they can be more predictive of environmental behavior than explicit attitudes (e.g. Vantomme, Geuens, De Houwer & De Pelsmacker, 2005), and more prone to social desirability effects. When these implicit attitudes are positive, they have a positive effect over environmental behaviors, by increasing their occurrence's probability (Vantomme *et al.*, 2005). However, when attitudes are anti-environmental they have a detrimental effect over environmental behavior and can influence behaviors in an anti-environmental direction.

Research shows that a behavior can be associated to various attitudes supporting it, depending on the individual or the situation; and yet the attitude that appears to support a behavior (explicit attitude) is not always the one most related to it (Palma-Oliveira & Gaspar de Carvalho, 2004). The attitude with the highest impact on behavior will be the one with highest cognitive accessibility (as demonstrated in the MODE model; Fazio, 1990). Accordingly, Kallgren and Wood (1986) consider that attitude strength, measured in terms of its accessibility, mediates the relationship between attitude and behavior (in the same level of specificity) in the environmental activism domain. Therefore, if an implicit anti-environmental attitude exists and is stronger (i.e., more accessible) than other attitudes influencing a certain behavior, it will affect behavior in accordance with its cognitive accessibility.

Apart from attitudes, other cognitive representations can have an automatic effect over behavior, such as stereotypes, norms and habits. However, there is a gap in environmental behavior research regarding these, given that most studies report the influence of explicit factors (Costarelli & Colloca, 2004; Schultz *et al.*, 1995; Stoll-Kleemann, 2001) and only a few have demonstrated the effect of implicit factors over behaviors (e.g. Vantomme *et al.*, 2005). Later on we will get back to this point and present our own research regarding this implicit effect over environmental behaviors and specifically to what concerns the effect of habit activation from situational cues.

Another example of unconscious barriers and constraints refers to the biased perceptions of the behavioral consequences on the environment, along with their social and personal consequences. In most situations, this perception distances from reality, which results from the existence of three possible reasons (Kollmuss & Agyeman, 2002): 1) the majority of environmental problems manifest in the long-term and are not immediately observed when changes in the environment occur (e.g., greenhouse effect); 2) the

environmental destruction is in general slow and gradual and we often pay more attention to sudden and drastic environmental changes (e.g., the Prestige oil-tanker leakage in North-western Spain in 2002) than to slower changes (e.g., ozone layer destruction); 3) environmental problems are mainly complex. Given the fact that we tend to simplify our worldview and economize cognitive resources (complexity vs. superficiality of cognitive processing; Smith & Mackie, 1995), this prevents us from having a global and clear understanding of these problems, which leads to an underestimation of their consequences.

Thus, these biased perceptions in particular and *unconscious barriers and constraints* in general follow the motivational and processing principles that guide human social behavior (Smith & Mackie, 1995) and take place without people being consciously aware of them. By influencing people's perception of the surrounding environment, these processes can lead to a perceived constraint like an unrealistic optimism regarding environmental problems (Hatfield & Job, 2001), since we are not able to process all the information that is presented to us but only a limited part of it.

Following from this, we argue in favor of the *unconscious barriers and constraints* inclusion in environmental behavior research and attitude and behavior change projects, given that they can have their effect without people being aware and thus can't be analyzed through traditional perception based measures. It should be noted that in the last few decades, implicit perception based measures have been used in ecological behavior research, as is the case of the Implicit Association Test (see Vantomme *et al.*, 2005). Nevertheless, this is still not enough to tap into the processes involved in the development of attitude-behavior inconsistency and other methodological tools are still needed to provide a more complete "picture". Moreover, in order for their relevance to be more explicit, we need to place them within the "full picture" by showing how they relate to perceived barriers and constraints, in order to influence environmental behavior. Moreover, we should demonstrate how these

types of barriers and constraints relate to behavioral goals. We will refer to these aspects next.

WHY DO PEOPLE FAIL TO ACT? - A MODEL PROPOSAL

In order to get a coherent view from the literature on barriers and constraints on proenvironmental behavior and to make clear the argument in favor of a "negative"[2] behavioral analysis, we will next propose a socio-cognitive model in this regard. In this, we will not include the category of *lacking factors* (which result from the absence or weak influence of a positive determinant or "right" factor), since that they are more or less explicitly included in models of positive determinants of proenvironmental behavior. In opposition, the psychological factors as defined by us in terms of *perceived barriers and constraints* and *unconscious barriers and constraints* are victims of some "gaps" in the literature and attitude-behavior change projects, either because they have received very little attention (as is the case of the latter) or were wrongly conceptualized in a non-psychological level of explanation (as is the case of the former).

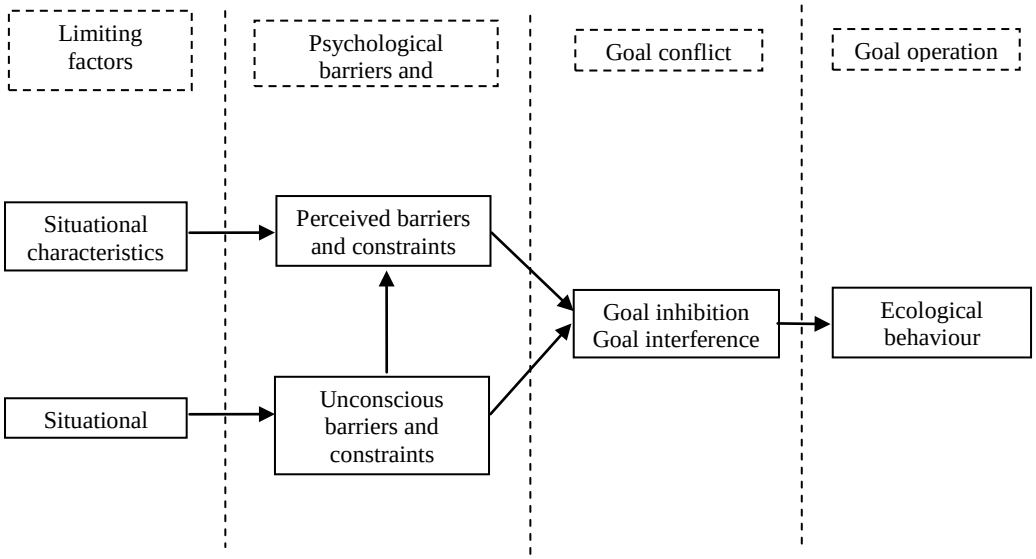
The research field of negative barriers and constraints can be also loosely defined as the study of the "I don't understand why it didn't work" factors, which are considered among the main causes of unsuccessful Environmental Education and Behavioral Change projects (Palma-Oliveira & Gaspar de Carvalho, 2004). These factors can be included in what we call the DN-Work model ("didn't work"), which we will present here. This model has three main principles: 1) barriers and constraints are not defined in terms of the "lack" of strength or absence of positive factors -what we call the "lack factors"- but as independent psychological factors from these; 2) their influence depends on psychological processes interacting in

[2] By negative, we mean the factors that can work as barriers and constraints to proenvironmental behaviour and thus, oppose to the positive, which promote their development and maintenance.

different levels and ways with situational features, and is mediated by the activation of behavioral goals (Bargh & Chartrand, 1999); and 3) their influence can occur in different degrees of awareness and conscious mediation. This model proposal will try to fill the gaps identified, first of all by operationalizing the concepts to use from now on.

In the first part of the model (see Figure 3) the situation is considered as having an effect on behavior given the presence of limiting factors, with this category including either path: 1) the situational characteristics that activate psychological barriers and constraints, through the mediation of conscious/intentional processes or 2) the situational cues that activate psychological barriers and constraints, with reduced consciousness and through unintentional and automatic processes. Consequently, we call the psychological barriers and constraints, which are activated through the first "path", perceived barriers and constraints; while the psychological barriers and constraints which are activated through the second "path" are the unconscious barriers and constraints.

Figure 3. DN-Work model of barriers and constraints on ecological behavior



We make a distinction between the two types of situational limiting factors, for the purpose of making clear our explanation of the different psychological processes involved in

each path. However, there is some overlap between “characteristics” and “cues”, given that the same limiting factor can sometimes work as one or another, or as both. For example, watching a neighbor watering the front lawn works as a situational characteristic by eliciting the belief that there is water abundance and therefore, conservation is not an urgent matter (thus, constraining the behavioral goal of water conservation). At the same time, this event can work as a situational cue to activate the implicit norm of spending as much water as we want in watering the lawn, given that it is the behavior that most people engage in at that neighborhood (thus, facilitating the anti-behavioral goal of spending water).

Additionally, there are situations in which different processes are elicited not by the same limiting factor but by different limiting factors. One example regards the behavior of buying non-organic products such as non-organic milk. On one side, the organic milk high price can work as a perceived barrier/constraint to not buy organic, eliciting a high perceived cost and incommodity in performing that behavior. On the other side, the presence of non-organic milk familiar brands can activate the non-organic milk buying habit, which can inhibit an intentional organic milk buying goal and increase the probability of performing in accordance with a non-organic milk buying goal. We will get back to this example later on in the next chapter.

Regarding the concept of psychological barriers and constraints on proenvironmental behavior, we define them as factors that can: 1) lower the activation strength of proenvironmental goals and/or increase the activation strength of anti-environmental goals – behavioral constraints; 2) elicit the activation of an anti-environmental goal and inhibit the activation of proenvironmental goals – behavioral barriers. This distinction refers to the magnitude of the effect. If a factor has a weak-to-moderate effect, it works as a behavioral constraint by means of a goal interference effect - hampering with proenvironmental behavioral goals (i.e., proenvironmental actions can still occur, although with reduced

frequency or effectiveness). If this factor has a strong effect, it works as a behavioral barrier by means of a goal inhibition effect - inhibiting proenvironmental behavioral goals (i.e., facilitating anti-environmental behavioral goals, meaning that proenvironmental actions cannot occur).

We make this distinction between barriers and constraints and in terms of the effect's magnitude since that, as our model acknowledges and as is it happens most of the times in real world, environmental decisions are associated with a state of goal conflict between proenvironmental and anti-environmental behavioral goals (e.g. decision between having a cooperative or competitive behavior, i.e., saving vs. spending much water while taking a shower; Garcia-Marques & Palma-Oliveira, 1989). Which goal "wins" this conflict[3] depends on the situation where the behavior is expected to occur but also on how barriers and constraints interact. Accordingly, anti-environmental goals are expected to be stronger when there is a conflict effect adding to an interference effect, i.e., when barriers and constraints "work" together. This is supported by the Goal Systems Theory (Kruglanski *et al.*, 2002), which claims that accessible goal alternatives or "background" goals (e.g. anti-environmental) can either pull away resources from a focal goal by reducing its activation strength and goal commitment or facilitate its activation, depending on what is activated and the context in which it happens. The negative effect can happen even when the activation of alternative goals is subliminal (priming) by: undermining the commitment to the focal goal, hampering progress toward the goal, hindering the development of effective means for goal pursuit and dampening participant's emotional responses to positive and negative feedback about their goal striving efforts (Kruglanski *et al.*, 2002; Shah & Kruglanski, 2003).

[3] When there are multiple goals competing, only the "winning" goal will be translated into behavior, i.e. will reach the goal operation phase (Kruglanski et al., 2002).

Unrealistic optimism about environmental degradation (Hatfield & Job, 2001) or uncertainty about resources level of availability and about how many people are cooperating in a proenvironmental way (Biel & Garling, 1995; De Young, 1999) can be considered behavioral constraints. This is because they reduce the level of goal commitment (Kruglanski *et al.*, 2002) and the strength of a proenvironmental goal intention like "I intend to save water while taking a shower", which causes a goal interference effect. In a different way, the high accessibility of an anti-environmental habit (see next chapter) or its perceived benefits in terms of comfort (Kollmuss & Agyeman, 2002) can work as barriers by facilitating the activation of an anti-environmental goal such as "spend much water while taking a shower" and inhibition of a proenvironmental goal ("conserve water while taking a shower"), which causes a goal inhibition effect.

Apart from the interaction between competing goals and the barriers and constraints role in this, another interaction effect is acknowledged by our model. In fact, the *unconscious barriers and constraints* might have their effect not only directly on behavioral conflict but also indirectly, through their influence on the *perceived barriers and constraints*. An example of this is the cognitive inaccessibility of proenvironmental/cooperative behavioral options in a social dilemma situation (with the anti-environmental/competitive options being more accessible; Biel & Garling, 1995; Palma-Oliveira & Gaspar de Carvalho, 2004; Tanner, 1999). Such a cognitive inaccessibility can affect behavior as an unconscious barrier and/or constraint. This can be due to the work of an information-processing heuristic which does not take into account all the behavioral options but only some of them, based, for example, on some criteria habitually used in similar decisions (Palma-Oliveira, 1995). These cognitive options of inaccessibility can promote a perceived lack of opportunities to behave in a proenvironmental way, which work as a perceived barrier/constraint. Some Environmental Education and Behavioral Change projects and psychological models attribute this to the lack

of opportunities presented by the situation where the person is in, when in fact this perceived lack of opportunity might result from cognitive processes. Moreover, if the cooperative behavioral option (or the small number of them) that comes to mind is seen as involving high perceived costs in performing the behavior (Palma-Oliveira & Gaspar de Carvalho, 2004), then the probability that the proenvironmental behavior is performed is even lower.

As in any new theoretical model, although the DN-Work model is based on theories and studies supporting its fundamental claims, there is still not enough research on its specific predictions. Given this gap, we will present in the following two chapters, research assessing the least studied category of the model and the processes involved in its influence on environmental behavior: unconscious barriers and constraints.

CONCLUSIONS

Most of the Environmental Education and Behavior Change projects and models regarding environmental behavior are still biased by a "positivity fallacy", i.e., the belief that as long as people have the right attitudes, intentions, skills, information, etc., the right proenvironmental behavior should follow. However, the social sciences literature shows that there is an inconsistency between attitudes and behaviors in this regard and that the difficulty in changing behaviors is being underestimated. One reason for this to occur is that the factors working as barriers and constraints to environmental behavior are not analyzed and dealt with. In this regard, a behavioral analysis that includes the "negative" determinants should be performed.

Models studying the negative determinants of proenvironmental behavior consider that most barriers and constraints are non-psychological. Even those models acknowledging the importance of psychological barriers and constraints only see a part of the big picture. This is

because they do not consider the effect of automatic processes occurring outside people's awareness and consciousness, which mediate the effect of situations on behavior.

We aimed to fill these identified gaps through the DN-Work model, concerning the effect of barriers and constraints on proenvironmental behavior. This model specifies some conditions for their influence to take place, presenting psychological processes as mediators of situational influences on behavior, and transcending the incomplete and sometimes erroneous consideration of a direct influence of the former on the latter. Moreover, it suggests that the investigation of proenvironmental behaviors should be conducted not only by considering the different levels of individuals' analysis (person, group, society, world) but also by considering the different levels of the situation where behavior occurs (Pinheiro, 2009). This means that the situation should be approached from the most concrete level of analysis regarding physical features and tangible aspects, up to the most abstract level considering those characteristics and events associated with social environments, like other people's behaviors, attitudes, etc. One common error in this regard is the assessment of people's habits (at the individual level) as only determined by the social environment (e.g. neighbors; family living in the same house) and/or the city environment (e.g. urban planning). Often, this implies missing the influence of psychological processes in a more concrete level of the situation (the "psychological context"), in terms of the elicitation of automatic behaviors from certain situational cues. Only by matching these different levels of environmental behavior analysis and considering the different influences associated with them, we can "bring back" the situation to the psychological study of barriers and constraints impinging on environmental behavior.

Although the viewpoint presented in this chapter (i.e., the study of negative determinants) seems like a pessimistic approach to the study of environmental behavior, we think this is actually an optimistic perspective. In fact, by identifying factors increasing the

inconsistency between positive attitudes and environmental behaviors, we will be able to design interventions focusing on these factors and increase the success and efficacy of attitude behavior change programs. On the contrary, it is the design of interventions including only positive determinants and involving an incomplete explanatory level of the psychological processes involved that makes us pessimistic regarding the promotion of environmental behaviors and their maintenance in the long run.

As Corral-Verdugo (2001; pg. 149) states: “Given the complexity of ecological problems, it is better to respond in a plastic than in a rigid way”. This plasticity can be developed by increasing people’s environmental competency (Corral-Verdugo, 2002; see also Fraijo-Sing *et al.*, in press) in a way that individuals are enabled to resist the influence of barriers and constraints on environmental behavior. Whenever they are or are not able to perceive/identify those barriers and constraints by themselves, strategies aimed to increase people’s competence in dealing with them should be developed (Gaspar de Carvalho & Coutinho de Faria, 2003).

Other negative determinants still need to be identified and the processes involved should be assessed with various methodologies. Nevertheless, the model here described and its associated research can be a starting point to answer, from a psychological perspective, an unfortunately understudied question in proenvironmental behavior research: why do people fail to act?

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Chapter 2

HABITS AS DYNAMIC MENTAL REPRESENTATIONS

There is a widespread lack of success and efficacy in dealing with the inconsistency between positive environmental attitudes and the low frequency of the expected associated behaviors (Ferreira Marques, Palma-Oliveira, Marques & Ferreira, 1995), i.e., in explaining "why do people fail to act", either for not doing what we want them to do, or by doing the opposite of it. This is seen in many areas from research in Environmental and Consumer Psychology, or in attitude and behavior change programs development. In our view, this has to do with three main reasons (see chapter 1):

1) Positivity fallacy - the belief shared by many researchers and practitioners that as long as people have the right attitudes, intentions, skills, information, etc., the right behavior should follow. By falling prey to this fallacy, they consider only the factors that can promote or increase the consistency between attitudes and behaviors (positive determinants). At the same time they disregard the importance of the negative factors that can explain the attitude-behavior inconsistency (negative determinants), which can be studied through a negative behavioral analysis.

2) Lack of a psychological level of explanation – Even when the negative factors are taken into consideration, the psychological level of explanation is often disregarded or incompletely identified. Thus, most of the factors identified are socio-economical, urban planning and architectural for example, but not psychological. However, they can also be viewed within a psychological level of explanation. In our view, this implies an interactionist approach, with behavior considered to be the result of an interaction between the context and psychological processes.

3) Underestimation of the unconscious processes influence - The context effect on behavior can be mediated not only by conscious perception but also by cognitive processes of which people are not aware of that can work as unconscious barriers and constraints.

Given these three reasons for the lack of success and efficacy in dealing with factors that can explain the attitude-behavior inconsistency, we will present studies aimed at providing an example of this by showing the effect of habit as a negative factor (i.e., attitude-behavior inconsistency factor). In other words, to demonstrate it as a factor that by being present leads people to act in a way different from what we want them to, thus trying to overcome the first problem identified. A second general aim of this chapter will be to show habit as a dynamic mental representation (which makes attitude-behavior consistency more difficult to be promoted). In this sense, habit is considered to be a psychological factor which can have its effect outside people's awareness and conscious control, given the interaction between the situation and psychological processes, therefore responding to the other two reasons.

Hence, we intend to present a contribution to Environmental and Consumer Psychology given that the mentioned aspects have largely been ignored in research and practice. Specifically, we are interested in how habits can be activated and how the context or situation can influence their activation. Moreover, we can contribute to attitude and behavior change programs in the ecological and consumer domain, by showing the influence of barriers and constraints of which the target people (and project planners) might not be consciously aware. These barriers and constraints and the role of habits will refer specifically to the choice of ecological products and of non-habitual products. Finally, we can also contribute to extending the Social Psychology literature in general regarding the situational features and processes that can activate habits.

Before doing this, we will first define in the following sections what a habit is, within a psychological level of explanation and the processes and contextual influences involved in its activation.

HABITS AS MENTAL REPRESENTATIONS

Classic views of habit consider it to be a behavior that frequently occurred in the past and for that reason tends to be more probable to occur in the present, than other alternative behaviors. Therefore, one classical defining characteristic of habit is its frequency of occurrence (Verplanken, 2006) or frequent pairing of a stimulus and a response (Aarts & Custers, 2009). This represents a rigid view of habit in which if we are in a context where a habitual behavior is performed and the behavior is reinforced in some way, we won't have much choice (free will) and thus we will be obliged to perform it. This classic view is based on behaviorist theories (classical and operant conditioning; Aarts & Custers, 2009) and sees habits as a "response", more than a "psychological process" resulting from the interaction of the context with cognitive and motivational factors other than reinforcement.

In the last decade, one line of research on habits has shown that they might not be so rigidly determined and distinguishes them from other forms of repeated automatic behavior (e.g., body reflexes). This view sees them as depending on the interaction of goals and context, defining habits as goal-directed automatic behaviors that are mentally represented (as knowledge structures; Higgins, 1989) and can be triggered by environmental cues (Aarts & Dijksterhuis, 2000; Aarts, Verplanken & van Knippenberg, 1998; Verplanken, Aarts & van Knippenberg, 1997). In other words, a pre-condition for habitual behavior to be performed automatically (e.g. travel by bicycle) is the existence of an active goal (e.g. having to attend a lecture) due to the presence of relevant environmental cues (e.g. travel locations), with goal being defined as "an internal representation of a desired state, such as a behavior or an outcome" (Aarts & Custers, 2009; p. 2). In opposition to the traditional views that define habit in terms of frequency of past behavior, the literature based on these ideas considers frequency to be a necessary but not sufficient condition for the development of habit, since there are cognitive and motivational processes that mediate the development of a habit.

In this sense Aarts and Dijksterhuis (2000) claim that the mental representation of frequently pursued goals or habits is comparable to other knowledge structures that are also frequently used and automatically activated, such as stereotypes and attitudes. The particularity of habits is that they are considered mental representations of links between goals and actions that become automatically activated in the presence of environmental cues, with sufficient repetition of behavior. This activation can occur outside people's awareness, even when that behavior is not actually performed (Aarts *et al.* 1998), which follows from the idea that social behavior is usually "triggered automatically on the mere presence of the relevant situational features", without mediation of conscious processes (Bargh, Chen & Burrows, 1996; p. 231). Accordingly, some authors consider that there is still not enough evidence to support the widespread view that conscious mediation "is the rule rather than the exception" (Bargh, 1997; p.5). In fact, since the 1960s research in social psychology has increasingly demonstrated the relative automaticity of social behavior and the influence of cognitive and motivational factors outside people's awareness on behavior (Bargh, 1997).

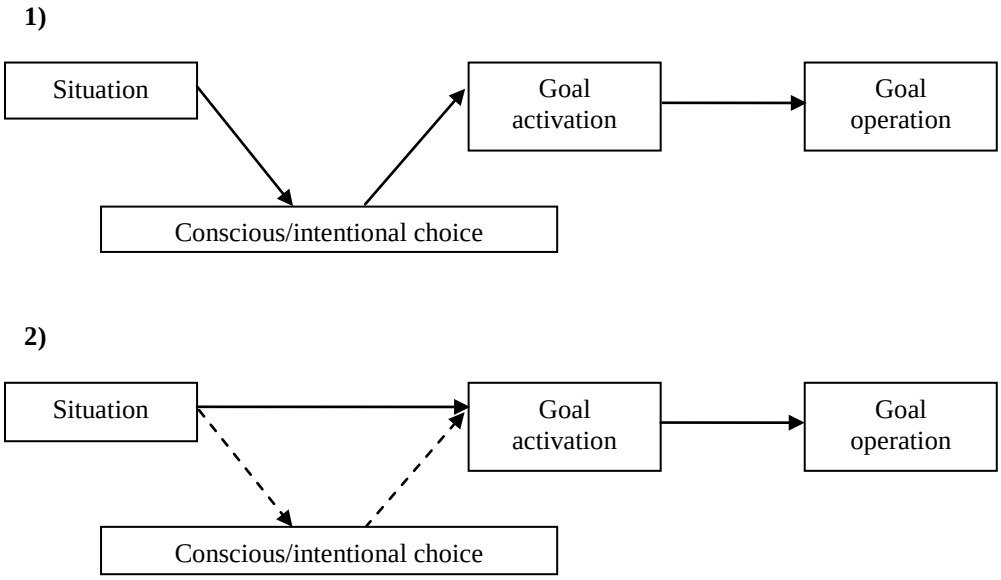
First, to be clear on how the automatic processes can have their effect, it is important to understand what we mean by automatic and conscious processes and the differences in the way they are initiated and can influence social behavior. Conscious processes are mental acts of which we are aware, that are intentional, effortful and controllable (Bargh & Chartrand, 1999). In a different way, for a process to be automatic, it has to be effortless and happen when a set of preconditions are in place (conditional automaticity), without any conscious choice or guidance from that point on (Bargh, 1997). Regarding this, we specifically consider the goal-dependent automaticity and its influence on social behavior, as this type of automaticity requires an initial past or present intention or act of will for the goal to be activated (Bargh & Chartrand, 2000), which corresponds in this initial phase to the intentional behaviors usually studied in Environmental and Consumer Psychology.

Many studies in the last decades showed the automaticity effect on behavior. For example, in an experiment by Bargh, Chen and Burrows (1996; Exp.1), participants whose concept of rudeness was primed interrupted the experimenter more quickly and frequently than did participants primed with the polite-related stimuli. In another study, participants for whom an elderly stereotype was primed walked more slowly down the hallway when leaving the experiment than did control participants, consistent with the content of that stereotype (Bargh *et al.*, 1996; Exp.2).

This line of research shows that the cognitive activation of a certain knowledge structure by means of the relevant situational characteristic or context cues, can automatically elicit the associated behavior. In another line of research, some authors consider that automatic behaviors are goal-dependent and therefore, this automatic "triggering" of behavior also occurs in the presence of relevant cues but with the mediation of goal activation. An example regarding this line will be presented later on.

The latter line of research is supported by Bargh and Chartrand's (1999) dual model of goal activation, which considers that the cognitive and motivational processes that take place prior to goal operation and the way in which this behavioral goal is activated can vary in two ways (Bargh & Chartrand, 1999; as seen in Figure 4): 1) Triggered by a conscious and intentional mediation or an act of will (e.g., as in the case of athletic skills), which corresponds to an intended goal-dependent automaticity; 2) Triggered automatically by environmental features, unintentionally and without awareness (e.g. stopping the car after a red sign without a conscious decision to do it), which corresponds to an unintended goal-dependent automaticity.

Figure 4. Dual process model of behavioral goal activation (Bargh & Chartrand, 1999).



Based on this model, the authors consider that with a frequent implementation of the same intentions and decisions in the same contexts (i.e., the more familiar and stable they are), the operation of the goal becomes automatic, as represented by the first type of activation. However, a reduction of consciousness can take place, which means that control is passed from the individual onto the environment (conferring a higher relative weight to the environment's influence), as represented by the second type of activation (Gollwitzer, 1999). In other words, the first type of activation can lead to the second, depending on the frequency and consistency of the activation and operation of the same goals in the same contexts (Bargh & Chartrand, 1999).

One example of the automatic activation of goals from situational cues is the case of habits, which was demonstrated in a study by Aarts and Dijksterhuis (2000; experiment 1) using independent measures of the cognitive strength of the goal-action associations regarding high opportunity behaviors (behaviors that can be performed frequently). They tested the assumption that the activation of travel goals through contextual priming can

automatically activate the habitual action (travelling behavior), due to their mental association. Their prediction was that this only happens for people with strong habits and this influence occurs outside conscious awareness[4]. The results showed the predicted two-way interaction of habit strength and goal priming: the habitual bicycle users that were primed with the relevant travel goal showed faster responses in the following word association task compared to the nonhabitual participants. This effect was not present in the non-goal condition, which supported the assumption that the activation of travel goals was a pre-condition for the mental accessibility of the habitual travel behavior.

Summarizing, in this line of research (e.g. Aarts *et al.*, 1998; Verplanken *et al.*, 1997) habits are seen as goal-directed automatic behaviors that are mentally represented, with their operation depending on the existence of an active goal and the presence of the relevant environmental cues to activate that goal. This view is very important since it goes beyond classical reductions of habit to simple S-R associations between environment (stimulus) and behavior (response). Thus, it acknowledges the mediation of cognitive processes (and specifically of behavioral goals activation) which research in social psychology in general and social cognition in particular has shown, since the 1960's.

Although this mediation of cognitive processes is acknowledged by many, the behavioral goals mediation is not so peacefully acknowledged. In fact, another recent line of research partly disagrees with the line of Aarts and Dijksterhuis (2000), seeing habits as automated (learned) dispositions to repeat past performance, that are cued by aspects of the performance context (the physical setting; preceding actions; a person that is typically present, etc.), without the mediation of goals (Neal, Wood & Quinn, 2006; Wood & Neal, 2007). Accordingly, Wood and Neal's Habit Model (2007) views habits as goal-independent

[4] Since that the participants weren't in a context where their chronic construct could be naturally activated, this had to be done through a more artificial means, using contextual priming (Higgins & Brendl, 1995).

automatic behaviors, which are automatically formed through a slow process of association between responses and contexts cues, i.e., behaving frequently in the same way, in the same situations. For example, buckling the seatbelt (behavior) always after entering the car (context) gradually forms a link between the two, which is represented in procedural memory. The cuing of habits based on the context, given the existence of this mental representation, can occur in two ways: 1) direct context cuing and 2) motivated cuing.

The first type of cuing implies that after the representation is created through associative learning, "merely perceiving a context triggers associated responses" (Neal *et al.*, 2006; p. 198). In this sense, they are closer to a theoretical view which considers a direct perception-behavior link (Dijksterhuis & Bargh, 2001; Prinz, 1997), as exemplified by the experiment from Chartrand and Bargh (1996), in which merely perceiving other people's movements resulted in non-conscious and unintentional mimicry of their behaviors. However, this particular experiment showed that this direct perception-behavior effect evident in the mimicry effect, might be the basis of social bonding, communication and influence for example (Chartrand & Bargh, 1996), without any evidence that this effect might be present in habit formation and activation.

Other areas of research present some evidence that might support the direct habit cuing idea, as for example, cognitive neuroscience. In this area, some studies showed that when behaviors are under the control of habits, the goal-related neural structures (pre-frontal cortex) aren't activated (e.g. Daw, Niv & Dayan, 2005; Neal *et al.*, 2006). However, this was studied only for explicit-goals and there is still no evidence that the same neural structures are used for explicit and implicit non-conscious goals[5] (the latter, being the one's usually

[5] The only neuroimaging study that affirmed this used only monetary incentives (Pessiglione et al, 2007; cited by Wood & Neal, 2007), which is a type of cue that, to our knowledge, is not used in habit-goal research and therefore, is not related to the type of goals that mediate habits identified in research.

associated with habits, given their automatic and unintended characteristics; Aarts & Dijksterhuis, 2000). In spite of this, research on direct cuing effects is still limited and needs further development (Neal *et al.*, 2006) and the few examples demonstrating its effect are not from habit research.

Another type of habit cuing identified by Wood and Neal's Habit Model (2007) is the motivated cuing. According to this, context can gain a certain motivational value when they have preceded rewards in the past (Neal *et al.*, 2006). Thus a certain context cue (e.g. movie theatre) elicits a habitual behavior (e.g. eating popcorn), given that a reward is associated with being in that context (positive affect associated with eating popcorn) (Wood & Neal, 2007). The authors differentiate this type of cuing from direct cuing because they consider the latter to be a "cold effect" (cognitive based) and the former to be a "hot effect" (motivation based), although the processes involved are expected to be the same.

Evidence of this comes from animal-learning research, which shows that when a habit is present, despite of not giving a reward that was initially associated with the behavior (pressing a bar to receive food), habits are not changed (i.e., they continue pressing the bar despite of not receiving the reward). In opposition, when a habit is not present, not giving a reward stops the behavior. However, there is no evidence that this result might be due to a cuing of a context-response cognitive representation (as argued in the direct habit cuing viewpoint) and that the same happens in humans (Wood & Neal, 2007). Nevertheless, as for direct cuing, the evidence comes from animal studies and it is not clear that this result might be due to a cuing of a context-response cognitive representation. Moreover, there is no proof that a goal doesn't mediate habits when rewards are present (e.g. the behavior of eating popcorn might occur because a goal to eat popcorn was activated by being inside the movie theatre). In fact, there is evidence that goals and positive affect (considered a reward, in the motivated cuing viewpoint) can actually co-occur and (if they are not incompatible) that

positive affect allows for goal pursuit to continue (Aarts, Custers & Holland, 2007). Thus, although a reward is present in a certain context that doesn't prove that habitual behavior is cued by it and not by a goal, since both can co-occur.

In spite of all the specific differences between the two lines of research presented: goal-independent (Neal, Wood & Quinn, 2006; Wood & Neal, 2007) and goal-dependent (Aarts & Dijksterhuis, 2000; Aarts *et al.*, 1998; Verplanken *et al.*, 1997), we are mostly interested in another one: flexibility in habits activation from context and the consequent response. Both perspectives see context cues as determinants of habit activation, by means of mental representation activation. However, for the goal-independent view, the context-behavior association is seemingly more rigid because if the specific context cue is present then the habitual behavior follows (i.e., the same contexts elicit the same behaviors over and over). Differently, in the goal mediation perspective, habits are implicitly seen as dynamic and flexible mental representations, since that their presence is dependent on goal activation by contextual cues. In accordance, for the same context, the habitual behavior might or might not occur depending on the activated goal (e.g. hearing the sound of the alarm clock may elicit the habitual behavior of taking a shower and preparing to go to work, only if a work goal is activated; if a leisure goal is activated - e.g. because it is Saturday -, this specific cue doesn't elicit the habitual behaviors of preparing to go to work; Aarts & Custers, 2009). Nevertheless, the goal independent perspective replies to this critic, given that although they don't acknowledge the goals mediational role, they still consider goals to be important since they can interface with habits to produce behavior in certain contexts (Wood & Neal, 2007).

In spite of considering ourselves as closer to the goal-dependent perspective (Aarts & Dijksterhuis, 2000), we don't aim to support one perspective over the other with our studies. Our argument is that goals, regardless of their mediational roles, are important in responding to the following question: Do habits involve a rigid mental representation dependent only on

the context or do they involve a flexible and dynamic mental representation resulting from an interaction between the context and behavioral goals?

HABITS ACTIVATION RULES

Despite of the identified differences between conceptualizations of habits, both perspectives agree that habits involve a mental representation, either in terms of goal-response or context-response cognitive associations, going beyond traditional views of habits as simples S-R associations. Thus, independently of the mental representations content, given the fact that they involve cognitive knowledge structures, they should therefore share some characteristics of this type of structures (Aarts & Dijksterhuis, 2000) and involve similar rules in order for the representation to be activated and translated into action, based on the surrounding context. It is these characteristics and rules that we will refer to next.

According to the "synapse model" (Higgins, 1989; Higgins, Bargh & Lombardi, 1985), mental constructs (knowledge structures) need to be activated, in order to be translated into action. This works in an analogous way to synapses in human body, in which their excitation leads to the muscle movement. In accordance, as for synapses, the "decay over time of the excitation level of a construct following its last activation is slower when the construct has been frequently activated than when it was activated only once" (Higgins, 1989, p. 86). In this regard, given that habits are considered to involve a mental representation (similar to attitudes, stereotypes, …), they fit into this description since that they can be seen as chronic constructs, with high probability of activation in the present and future, given the fact that they were frequently activated in the past (Aarts & Dijksterhuis, 2000).

To what concerns this activation, the basic assumption of the synapse model is that the mental constructs level of excitation can vary prior to stimulus exposure: if the construct's level of excitation is high, the more likely is that the construct will be activated by exposure

to the stimulus. Moreover, a higher activation potential implies a higher likelihood that it will be translated into behavior, judgment or other relevant output (Higgins, 1989).

This excitation is achieved given a high cognitive *accessibility* of the construct or high readiness to be used at output (i.e., behavior). However, this readiness doesn't mean that the stored knowledge will actually be used at output. Accordingly, this actual use probability can be increased given a high *applicability* of the construct, i.e., the greater the overlap between the features of a knowledge structure and the features of a stimulus or the context that is presented to us, the greater that construct's applicability to that stimulus or context. Therefore, for a cognitive knowledge structure like a habit to be used, its activation potential (i.e., excitation) should be high and this can be achieved either by applicability and accessibility, independently or in interaction (Higgins & Brendl, 1995).

HABITS APPLICABILITY

Research on decision making has for many decades tried to identify the role of the decisional context characteristics in cognitive knowledge structures activation and their influence over behavior (e.g. attitudes, stereotypes), identifying which environmental features can facilitate or inhibit them (e.g. Eagly & Chaiken 1993). In this regard, literature shows that in stable contexts and in heavy load situations (exhaustion, time pressure, distraction or information overload), deliberate intentions lose their predictive value and habits become more predictive of behavior (Aarts *et al.*, 1998; Ouellette & Wood, 1998; Verplanken *et al.*, 1997; Verplanken & Orbell, 2003). In situations in which non-routine behavior is executed or when the context changes or is novel, intentions have more predictive value (Ouellette & Wood, 1998). In agreement with this, Verplanken *et al.* (1997) showed that participants with a strong (automatic) habit follow a more heuristic processing using less information and more superficial and non-compensatory information search strategies (leaving information relevant

to alternatives to their habitual behavior uninspected), comparing to weak habit participants. In their study, the latter used more elaborated information search and inspected equal amounts of information for each option.

From this, we can see that different types of information processing can be elicited in different contexts and thus be more facilitative of habits or intentions depending on their characteristics. These variations are also associated with applicability given that habits might be more applicable to some contexts than to others. So far, evidence of applicability effects in an automatic and unconscious way (see Higgins, 1996) hasn't been shown in habit research, although there are a few examples involving a more conscious judgment. Following from Higgins (1989; 1996) these can be considered as *perceived applicability* or judged usability effects, which refer to the perceived relevance and appropriateness of the stored knowledge for use in a given context. This judgment can determine choice independently of the information being objectively applicable or not. For example, a piece of evidence can be relevant for determining the guilt of someone being judged but the jury or judge decide that is inapplicable or inappropriate (Higgins, 1989) given some subjective criteria (e.g. being perceived as a potential bias) or some legal impediment (e.g. illegal obtainment of the evidence by the police). This perceived applicability is very important because it influences if an activated mental construct will actually be used or not, i.e., even if there is high cognitive accessibility, this might not have an influence over behavior (Higgins, 1996).

Evidence of the importance of this perceived applicability in order for habitual behaviors to occur comes from a study from Wood, Witt and Tam (2005). Although they don't explicitly acknowledge their results as a demonstration of a perceived applicability effect, in our view it can be conceptualized in that way given that it matches the definition given by Higgins (1996), based on their idea that "performance of everyday action is tied to the circumstances in which the actions typically occur" (Wood *et al.*, 2005; p. 920).

Accordingly, they performed a study on how changes in particular features of the context can disrupt or maintain habits, following from natural occurring changes, regardless of changes in intentions. Thus, they studied students that were relocating to a new university and assessed their exercising, newspaper reading and TV watching behaviors, one month before and one month after the change. The specific context features that changed between contexts (perceived context changes: e.g. social cues such as the presence or absence of other people) and the estimates of location change were assessed (determined from the frequency of past behavior and the stability of the performance context in the old university), in order to see if they could explain changes in habits strength. Results showed that as long as the context maintained its stability (i.e., the perceived applicability didn't change), strong habits did not change. In opposition, changes in the context disrupted habits, showing their dependence on supporting cues. Thus, this study shows that if there is a perception of the necessary context features being present, the habit will take place. If they are perceived as not being present, the probability of automatically activating the habitual behavior will be very low and therefore habit will not take place. Following from this, their prediction is that habits will be activated in stable contexts (a high perceived applicability is maintained) and will be disrupted if the context becomes unstable (i.e., if applicability changes and is perceived as low following from this). If the latter happens, behavior is expected to fall into intentional control (Danner, Aarts & de Vries, 2008).

HABITS ACCESSIBILITY

Another determinant of mental constructs activation, apart from applicability, is accessibility. It is argued that the more accessible a construct is, the higher the probability of its use (Higgins, 1989). This accessibility can be achieved in two ways: 1) chronic accessibility and 2) contextual priming.

Chronic accessibility occurs when mental constructs have a relatively high accessibility due to "natural" processes, given the frequent activation of the construct in the past (Higgins, 1989; Higgins & Brendl, 1995). In agreement, if a habit is strong, it is expected to be highly accessible and ready to be used (i.e., translated into action, choice or judgment) in a certain context. Contextual priming, on the other hand, implies a temporary and more "artificial" accessibility, which can be achieved through experimental manipulation at the laboratory. Independently of the source of accessibility, automaticity research has shown that temporary (contextual priming) and chronic constructs both have the same effects over behavior, although chronic constructs are more powerful in longer intervals between priming and judgment. Thus, after a short period the chronic tendencies tend to dominate (Bargh, 1997; Bargh, Lombardi & Higgins, 1988).

Accessibility is also a characteristic of habits as mental representations (as shown in the experiment by Aarts and Dijksterhuis (2000)). Regarding habit formation, when people frequently pursue certain goals and certain behaviors are performed to achieve those goals, a cognitive link between goals and actions (means to achieve the goal) is formed. If this happens frequently in the same contexts in response to specific cues, the relevant goal becomes more accessible and being in that context increases the probability that habitual behavior is performed (Aarts & Dijksterhuis, 2000). In other words, when we prime a goal associated with a habitual response (make it more accessible) or the goal is already high in chronic accessibility, the specific cue-response links become more accessible. Consequently, encountering relevant cues (in the habitual context) when a goal is accessible triggers the habitual response (Verplanken & Orbell, 2003).

HABITS AS DYNAMIC MENTAL CONSTRUCTS

Conceptions of habit that consider context applicability to be the most important determinant of automatic behaviors activation (e.g. Wood *et al.*, 2005) view habits as rigid mental constructs, given that if it is not applicable to the context anymore, habitual behavior shouldn't follow. This view is based on the habit discontinuity hypothesis (Verplanken, Walker, Davis & Jurasek, 2008), which considers that when context changes (i.e., habit is no longer applicable), a "window" opens and behavior is more likely to fall under deliberation. Consequently, contextual changes are seen as a good opportunity for behavior change given that this can make relevant information related to behavior more salient and thus, lead to new decisions and behaviors. Nevertheless, interventions aimed at this should be more successful before, during or shortly after a contextual change, given that it is then that habit is more "fragile" and unstable and thus, can be changed (Verplanken *et al.*, 2008; Verplanken & Wood, 2006).

Conceptions of habit that consider either goals interaction with it (Wood & Neal, 2007) or their meditational role (Aarts & Dijksterhuis, 2000), on the other hand, view habits as dynamic cognitive structures in the sense that their activation is less context-dependent. This is because activation can be achieved by the interaction of top-down and bottom-up processes (Aarts & Custers, 2009), which in our view, refers to the interaction between accessibility and applicability. Accordingly, people can perform the same habits in different contexts as long as the same goal associated with habit is activated. For example, the activation of the goal to go to work activates the habitual car driving behavior, even if context changes occur, such as bad weather, giving a lift to a colleague, etc. This is in disagreement with the habit discontinuity hypothesis, which considers that when a context change disrupts a habit, deliberation becomes more likely (Verplanken *et al.*, 2008), because some context changes

don’t necessarily disrupt habits and some adaptation to them can take place. Moreover, people can sometimes perform a habit and sometimes don’t in the same context, depending on the relevant goal being accessible (alarm clock example given before; Aarts & Custers, 2009).

This habits flexibility and dynamism can also be demonstrated following from Goal Systems Theory (Kruglanski *et al.*, 2002), given that habits are goal-dependent automatic behaviors (Aarts & Dijksterhuis, 2000) or at least, interact with them in various ways to produce behaviors (Wood & Neal, 2007). According to this theory, behavior is determined by goal systems, defined as the cognitively interconnected goals and means that constitute motivational networks that are mentally represented, with these systems being characterized both by cognitive and motivational properties. As for other types of cognitive associative networks, this system implies a hierarchy with a super-ordinate knowledge structure – abstract goal – that can be associated with different sub-goals and each of these be associated with different means. These means can be defined as “any activity, event or circumstance perceived as likely to contribute to the attainment of a goal” (Shah & Kruglanski, 2003; p.1109). Thus, for example, a goal to be successful in life or to earn much money (abstract goals) can be associated with the sub-goal of going to work, which in turn might be connected to different means of using the car, using the subway or using the bike to go to work. Vertically in this hierarchy, facilitative effects can be found, in the sense that activating one nodule activates the others vertically connected with it. Thus, a goal can be activated by a mean associated with it (*means prime goals*; bottom-up process) or a mean can be activated given the activation of an associated goal (*goals prime means*; top-down process). The same doesn’t happen horizontally, since inhibitory effects can be found between competing goals and/or means (Kruglanski *et al.*, 2002). For example, activating a goal of studying for an

exam reduces the activation strength of an alternative goal(s) like the goal of doing a leisure activity such as watching TV.

This relationship between goals and means in this hierarchical structure can be translated into two main structural principles (Kruglanski *et al.*, 2002): equifinality – two or more means can be associated with the same goal; and multifinality – two or more goals can be associated with the same mean. To what concerns the interconnectedness strength, the higher the number of means associated with a given goal or vice-versa, the lower the cognitive strength of each connection. The exception to this occurs when there is an uniqueness in the association - only one goal associated with only one mean - or a repeated co-activation of elements (e.g. a goal and a mean, two goals or two means that co-occur frequently). This is the case of habits, being them characterized by a frequent co-activation between a mean and a goal in the same contexts, which confers to it higher activation strength when compared to the other interconnections in the goal system. In this situation, it is also expected that the activation of the target or focal goal (in this case the one associated with habit) will pull away resources from its alternative goals and means. Consequently, the striving to attain the former will weaken the activation of the latter.

Unlike semantic associations (e.g. nurse-doctor), the association between goals and means from frequent co-activation, involves motivational and functional relations that are cognitively stored (Shah & Kruglanski, 2003) and therefore confer to habits a higher dynamism. One example of this comes from two predictions of goal systems mentioned before: 1) means prime goals and 2) goals prime means (Kruglanski *et al.*, 2002). Following from this, we can increase habit activation strength and consequently the probability that it is translated into action, through a bottom-up process by exposing people to a mean cognitively associated with the goal – *means prime goals*. It is expected when presented with the mean, the associated goal is activated which in turn increases the probability of goal attainment, i.e.,

that people behave or decide according to the activated mental construct (Shah & Kruglanski, 2003). Given that presenting the mean in a certain context can increase the habit activation potential (by priming the goal associated) this can be seen as an increase in accessibility from contextual priming.

A demonstration of priming of goals through means was put forwarded by Shah and Kruglanski (2003). In their study they demonstrated that the subliminal presentation of means in terms of activities important for goal attainment such as “study” and “run”, increased the cognitive accessibility of education and fitness goals respectively, with this being mediated by the perceived effectiveness of the means to attain the goals (Shah & Kruglanski, 2003; study 1). This happened even for task goals and means in which the association was artificially created and therefore, there was no prior semantic association that could be used as a justification for the results (Shah & Kruglanski, 2003; study 2). Consequently, it supports the idea that this effect was not due to semantic association effects but actually to the functional association between the two (Shah & Kruglanski, 2003). Moreover, they showed that goal priming through its means has implications for goal pursuit in the sense that participants persisted significantly longer and performed significantly better on an anagram task compared to participants in the control group with this being mediated by increased goal accessibility (Shah & Kruglanski, 2003; study 3). Finally, they showed that goal priming by its means can have detrimental effects on self-regulation, given that if when we are pursuing a certain target goal related to task performance, a situational opportunity to pursue an unrelated task goal is primed, our attention is deviated and goal attainment follows the primed unrelated goal and not the focal goal. Thus, when primed with an alternative goal, participants persisted significantly less and performed significantly worse on an anagram task compared to the control group (Shah & Kruglanski, 2003; study 4). To summarize, these studies showed not only that we can prime goals through the associated means, but also that

this effect doesn't result from semantic association properties but from functional associations.

In a different way, we can also increase habit activation strength and consequently the probability that it is translated into action, through a top-down process by activating a goal cognitively associated with the mean – *goals prime means*. This was demonstrated in a study by Kruglanski *et al.* (2002) in which participants were asked to list three different personality attributes it was their goal to possess, one positive personality attribute they weren't trying to possess and one activity (mean) that allowed to attain each of these. Following this, they were asked to list all the activities they could remember that allowed them to attain each of the four attributes and finally a task in which they had to determine if a presented word was an attribute (goal) or an activity (mean), which randomly included the goals and means obtained from the first task. The prediction was that reaction times would be faster for judging means for which the related goal they were currently pursuing (one of three) was primed, compared with the group primed with the attribute they weren't trying to possess, which was exactly what was found.

This is a demonstration of an accessibility effect (Higgins, 1989), in which the priming of a goal increased the activation strength of a mental construct (goal-mean link) and therefore increased the probability of its use, evidenced in the increased accessibility of the associated mean. Also, the fact that an effect wasn't found for the prime of the attribute they weren't trying to possess shows that the result isn't due to a semantic association between mean and goal words but to the functional relationship between goals and means (Kruglanski et al., 2002). Although the Kruglanski *et al.* (2002) study didn't show the behavioral effects of this increased accessibility, many studies regarding other types of mental constructs activation show that this is expected to occur (see e.g., Bargh *et al.*, 1996; Bargh, Gollwitzer, Lee-Chai, Barndollar & Trötschel, 2001; Sheeran, Webb & Gollwitzer, 2005).

All these are examples of how goal accessibility can affect behavior and the cognitive processes. However, to our knowledge, there is no explicit demonstration of the interaction of applicability and accessibility (either through goal or mean priming), which to our knowledge hasn't been demonstrated yet in this literature. In our view, by demonstrating these we can demonstrate habits dynamic properties. To address this, Higgins and Brendl (1995) mental constructs *activation rules* seem to us particularly important.

In their view, accessibility and applicability are independent sources of a construct's excitation level. Following from the "synapse model" (Higgins, 1989; Higgins *et al.*, 1985), higher construct accessibility yields a higher excitation level. Also, higher construct applicability to the context yields a higher excitation level. As a consequence, the greater the excitation level, the higher is the probability that the construct will be activated and used. From this idea and based on a set of studies (Higgins & Brendl, 1995) they identified three rules for mental constructs activation.

Activation rule 1: Strong accessibility can compensate for weak applicability. Given that accessibility and applicability are both independent sources of a construct's excitation level, if there is high accessibility the construct can be activated even if its applicability to the context is low (e.g. all the necessary context features for the construct to be activated are not present in a sufficient degree).

This was demonstrated in a study by Higgins and Brendl (1995) in which they primed participants with the concept of "conceited". In this, both accessibility and applicability levels contributed independently to increase the degree in which conceited-related spontaneous impressions and judgments were made for target people. Moreover, these impressions were formed even in a condition of low applicability in which the stimulus description from which they had to make an impression was vague (weakly related to conceited) but the accessibility was increased. This happened either if participants had a chronic accessibility for conceited

or the conceited concept was contextually primed and when there was a short delay between the prime and the stimulus.

Although these results come primarily from constructs influence on judgments, this is still a very important rule to our argument that habits are dynamic mental constructs. We infer it also applies to habits given their conceptualization as mental representations comparable to other knowledge structures such as stereotypes and attitudes (Aarts & Dijksterhuis, 2000). Based on the view associated with the Wood *et al.* (2005) study, this rule wouldn't apply because if the context features are weakly associated with the response (low context applicability), habitual behavior will not occur. Differently, in Aarts and Dijksterhuis (2000) view, although behavioral goals accessibility seems to be sufficient for habits to have an influence on judgments and they implicitly acknowledge this rule, they don't explicitly acknowledge applicability's role. Thus, both perspectives fail in demonstrating the interaction between these two sources of mental constructs activation and this rule applied to habits maintains the status of untested.

Activation rule 2: Higher accessibility can yield stronger judgments even if perceivers are aware of priming events, if the additional contribution to activation from applicability and chronic accessibility is sufficiently great. Regarding this, Higgins and Brendl (1995) found that in the presence of an ambiguous stimulus description (strongly related both with "conceited" and "self-confident"), participants with chronic accessibility for conceited made more conceited-related judgments, even when they remembered (were aware of) the priming events (in a contextual priming + recall condition). Moreover, they argue that this might happen even if the stimulus is not ambiguous (but moderately vague) or strongly related to the target construct. Thus, if the contribution of applicability and chronic accessibility is sufficiently high, the priming is not perceived as contributing to the construct activation and therefore the construct is not suppressed by this awareness (Higgins & Brendl, 1995).

Activation rule 3: The relation between higher accessibility and stronger judgment is constrained when the applicability of a competing alternative construct is both strong and stronger than the target construct's applicability. Higgins and Brendl's (1995) study showed that when the stimulus description is contrary (self-confident) to the constructed being primed (conceited), neither chronic accessibility nor contextual priming of the target-construct (conceited) influence subjects conceited-related judgments. From this we can infer that high applicability of an alternative construct to a habit can constrain habit's accessibility and therefore its activation and use.

Given that recent lines of research consider habit to be a mental construct, in order to present our argument of habits as dynamic cognitive structures, we should demonstrate that they follow similar activation rules as other cognitive knowledge structures, resulting from an interaction between the situation and cognitive processes. In other words, our general aim is to show how habits can be activated and influence the subsequent decisions and behaviors, in ways that go beyond simple and static S-R associations. Moreover, behavioral goals confer them a dynamic character (Kruglanski *et al.*, 2002) not present in traditional views of habit defined it in terms of past behavior frequency. In this sense, as we said before, to determine if behavioral goals mediate habits activation (Aarts & Dijksterhuis, 2000) or simply interact or moderate its effect under certain conditions (Wood & Neal, 2007) is not the purpose of our study, since the dynamic characteristics conferred by goals can be demonstrated in both views.

Therefore, our study 1 aims to show these dynamic properties based on the Goal Systems Theory (Kruglanski *et al.*, 2002), given that this theory doesn't make an explicit argument in favor of either goal mediation or moderation, and shows exactly what we want it to show: that mental goal structures confer habits this dynamicity. Additionally, the dynamic features of habits can also be shown by demonstrating that habitual behavior can sometimes

result not only independently from applicability and accessibility (Higgins & Brendl, 1995) but from the interaction of both, which is an effect not yet studied on habits research. However, we will assess applicability only in terms of perceived applicability following from Higgins (1989; 1996) given that its effect has been shown in habit research (e.g. Wood *et al.*, 2005), and thus, we want to demonstrate the interaction of an already demonstrated effect with accessibility. Thus, this perceived applicability is important for habitual behaviors to occur, but it is not sufficient, and its interaction with habits accessibility should also be taken into consideration. We aim to achieve this in study 2 and 3 by means of Higgins and Brendl (1995) activation rule 1: *Strong accessibility can compensate for weak applicability*. By doing this, habits dynamic properties can be explored.

STUDY 1 – THE PERCEIVED APPLICABILITY EFFECT

Given the widespread perception of health and environmental advantages of organic food production (Hughner, McDonagh, Prothero, Shultz II & Stanton, 2007), and the high levels of environmental concern in many countries (Ferreira Marques *et al.*, 1995), we would expect people to behave consistently with this concern and buy organic products. However, in spite of the growing numbers of people that consume organic food, their reduction in price, increased availability and the positive attitudes towards this type of food (Bamberg, 2002; Hughner *et al.*, 2007), these numbers are still lower than the expected. This mirrors the classical finding in Social Psychology regarding attitude-behavior inconsistency (Smith & Mackie, 1995), in this case demonstrated for environmental attitudes and behaviors.

In this regard, habits can be considered psychological barriers to proenvironmental decisions to buy organic products and factors that promote attitude-behavior inconsistency, since their activation is associated with an increase in the activation strength of unintended

anti-environmental goals, which in turn increases the probability of an anti-environmental behavior or decision to buy a non-organic product. This is the aim of the present study.

Based on the principle that means can prime goals acknowledged by Goal Systems Theory (Kruglanski *et al.*, 2002), we want to asses if in the presence of two categories of means - organic and non-organic – all allowing the attainment of the goal to buy the same type of product, people will choose significantly more an option from the second category, given the existence of a non-organic buying habit associated with that product. However this is expected to occur more in a familiar context with familiar brands than in a new context with unknown brands, given that there is higher perceived applicability (Higgins, 1989; 1996) of habit to the context in the former.

In our view, a familiar context is one in which the existent means are recognized and perceived as frequently pursued means (product brands) to attain the goal to buy a certain product. Thus, there is a high probability of at least one or more of them having been bought in the past (being part of the choice set) or at least included in the decision (being part of the consideration set; see Shocker, Ben-Akiva, Boccara & Nedungadi, 1991) and thus be mentally represented. In other words, there is a high probability of a partial or complete overlap between the means present in the choice context and the means existent in the goal system associated with the habit mental representation. However, given that the context is familiar because it is expected to be perceived in that way, decisions in a familiar context will be determined by the degree in which habit (i.e., the means in the goal system) is perceived as applicable to such a context – perceived applicability. Therefore, habit will be followed more - more means chosen if they match or are similar to the ones that exist in the mentally represented goal system - if it is perceived as applicable to the context, than when this perceived applicability is low (new context). It should be noted that this perceived applicability refers to the perception of the context as being appropriate for the decision

according to the habit and not because the context is seen as similar to the habitual context[6]. Moreover, it should also be noted that the differences between these two contexts (familiar and new) in terms of perceived applicability, refer to differences in the *essential features* – features of the decision context which are relevant for the decision, such as changes in the means to attain the goal. These do not refer to differences in the *incidental features* - features of the decision context which are accessory for the decision and accompany. These are features that are not so relevant for the decision such as visual characteristics of the products, other people (e.g. family members) usually present during choice in the supermarket; characteristics of the web based environment, etc.

In accordance, our prediction is that the means both in the familiar and new contexts can prime the habitual behavioral goal but that its activation strength will have a greater magnitude in a familiar context, because there is a higher perceived applicability of habit to that context. This activation strength can be demonstrated by showing a higher choice for means associated with habit in the familiar versus the new context. This is not explicitly acknowledged in the Goal Systems Theory and hasn't been demonstrated in habit and goal research. Moreover, it should be noted that this is not incompatible with a goal-independent view of habits given that the choice situation (including the habitual and alternative brands) can be mentally represented and thus, if the decision context is perceived as highly applicable, the habitual behavior should follow.

In our view, this perceived applicability doesn't come only from the fact that the habitual mean (habitually bought brand) to attain the goal to buy the product is present.

[6] The decision making tasks in the present study were designed to involve the decision in an internet environment which is not similar to the habitual supermarket or local shop environment. Therefore, the context is not similar to the habitual context but the products can still be perceived as appropriate to goal attainment (relevant for the decision making task).

Accordingly, even if the habitual mean is not present in the available choices, the non-organic milk habit can still be applicable given the existence of other similar means which co-occurred often in the past with the goal to buy milk or might even have been chosen in its absence as an alternative. This involved a repeated pairing of these elements in the goal system in a stable context (in similar situations overtime). These habitual and alternative means can be not only connected in the goal system with the product buying goal but also with each others as acknowledged in Goal Systems Theory (Kruglanski *et al.*, 2002). Thus, the context is perceived as applicable as long as the existent means allow for equifinality (Kruglanski *et al.*, 2002) in the attainment of the product buying goal.

However, given the low level of organic products bought in general, we infer that if we choose a certain product for which this is the case (e.g. milk), then in order to attain the goal to buy the product, people have chosen the non-organic means more often and thus, for that product we can consider the existence of a non-organic buying habit. In other words, to what concerns the organic milk buying means, they might have co-occurred in the past with non-organic milk buying. Nonetheless, we infer that their connection with the product buying goal is weaker than the non-organic buying means in the goal system, given that the latter might have been paired more often with the goal and considered more often as an alternative to the habitual product, than the former. This is in accordance with the fact that people in general report a higher percentage of non-organic than organic products bought (Hughner *et al.*, 2007).

It should be noted that we don't consider that a general non-organic products buying habit exists, given that someone can buy non-organic options for a certain product (fruit) but not do the same for a different product (e.g. milk). What we consider is that for certain products, given a more frequent pairing of the goal to buy the product with non-organic buying means to attain that goal, a non-organic buying habit can be considered to exist for

that product. I.e., it is the same to say that there is a product X buying habit or a product X non-organic buying habit, given that the non-organic means are the frequently chosen option.

Since we infer that there is a stronger connection between the product buying goal and the non-organic means (given the habit to buy the non-organic option of the product), habit will be perceived as more applicable to them in a familiar context and thus there will be a higher probability of choosing one of the non-organic familiar means. Accordingly, Aarts and Custers (2009; p.5) consider habit as a "tendency to respond in a specific way to a specific stimulus as a result of strong associations between the two". However, this doesn't mean that in the presence of various stimuli, if that specific stimulus is not present, habitual behavior won't occur. In fact, in a given decision context, the product habitually bought can be chosen (if it is present in the choice context) given this association but a similar one with an equal or lower association can also be chosen as long as it allows for the attainment of the goal. This can evidence habits dynamic properties and that more than a cognitive association effect, it involves a motivation component based on the principle of equifinality in goal systems (Kruglanski *et al.*, 2002). In the new context, there can still be some increase in the product buying goal due to mean priming but in this case, the perceived applicability to the options available will be lower. This is because we don't expect an overlap between the milk buying goal and the context given that the means present didn't co-occur in the past with the milk buying goal and therefore, the "bias" toward non-organic choice should be lower.

Following from this, we aim to replicate the perceived applicability effect in an ecological products decision making context, with high familiarity being expected to facilitate the application of habit to the decision context and low familiarity (or context novelty) to constrain its influence. In accordance, in other areas of research, familiarity has shown to increase non-analytic processing of person information and subsequent judgments (see Garcia-Marques & Mackie, 2007). Also, context familiarity can be seen as a

characteristic of stable contexts, which are more facilitative of habit activation (Danner *et al.*, 2008). Although we define familiarity differently from the literature regarding these findings, the pattern is expected to be the same and thus it will be assessed as a psychological determinant of habit activation.

Moreover, we will maintain price and organic and non-organic products availability constant between contexts, since these usually work as post-hoc justifications for not behaving in a proenvironmental way and to maintain non-organic products buying habits. We aim to argue against this, by showing means familiarity as a psychological dimension with different processes involved from the physical or socio-economic dimensions usually considered to be the cause of some anti-environmental behaviors (Palma-Oliveira & Gaspar de Carvalho, 2004). By doing this we can demonstrate the habit effect as an unconscious barrier to proenvironmental decisions to buy organic products, in a psychological level of explanation of the attitude-behavior inconsistency.

Apart from the prediction regarding the effect of perceived applicability for the first choice in a list of organic and non-organic products, we will also assess the choice of two additional options - different products from the first but within the same list. This is because even though there is a reduction in the perceived applicability (given the reduction in the available choices), a certain level of it might still be enough to allow for consistency in the choice of a product similar to the habitual product, compared to a new context in which it is perceived as much lower. According to research on goal activation and fulfillment, an effect should cease to exist after the goal is fulfilled in the first decision, given that upon this attainment, a decrease in goal activation follows (Förster, Liberman & Higgins, 2005; Förster, Liberman & Friedman, 2009; Liberman, Förster & Higgins, 2007). However, these studies are not explicit concerning what happens if other alternative equifinal means are still available after the first choice and also allow for goal attainment. Furthermore, even if

inhibition of alternative means to the one chosen first occurs, this is not expected to occur immediately after the mean choice (Danner *et al.*, 2007) and thus the subsequent choice of alternatives is still possible.

In short, our argument is that in spite of the goal being attained in the first decision, the effect can still occur in the following choices even if there is a reduction in the context's perceived applicability, as long as other means are still perceived as allowing for goal attainment[7] and thus maintaining its activation potential. This is expected to happen in a familiar context and not in the new, with the choice of non-organic products being consistent from one decision to another. The reason is that in the familiar context these alternative means have a higher probability of having co-occurred in the past with the habitually chosen mean and thus, although the context becomes less applicable, it is still applicable enough to allow for goal attainment. In the new context the non-organic means didn't co-occur in the past with the habitually chosen mean and thus the perceived applicability is lower, compared to the familiar context. This can be a demonstration of habits dynamic properties and the role of goals in this, given that this consistency is expected as long as the mentally represented goal system remains valid and applicable. In other words, despite of the perceived context changes, as long as a stable goal structure (i.e., strong habit) is associated with a product, we can expect a transfer between decisions and consistency in the choice of non-organic means.

Unlike the first prediction that was compatible both with a goal-independent and goal-dependent view of habits, this second prediction is more supported by a goal-dependent view of habits. This is because for the second and third decisions the perceived applicability is

[7] We acknowledge that different people might have different goal systems and that this should only happen for people with a strong habit and if these means are part of the goal structure. To increase the probability that this is the case, a pre-test will allow choosing the most familiar and frequently bought brands, to be used in a decision task in the main study.

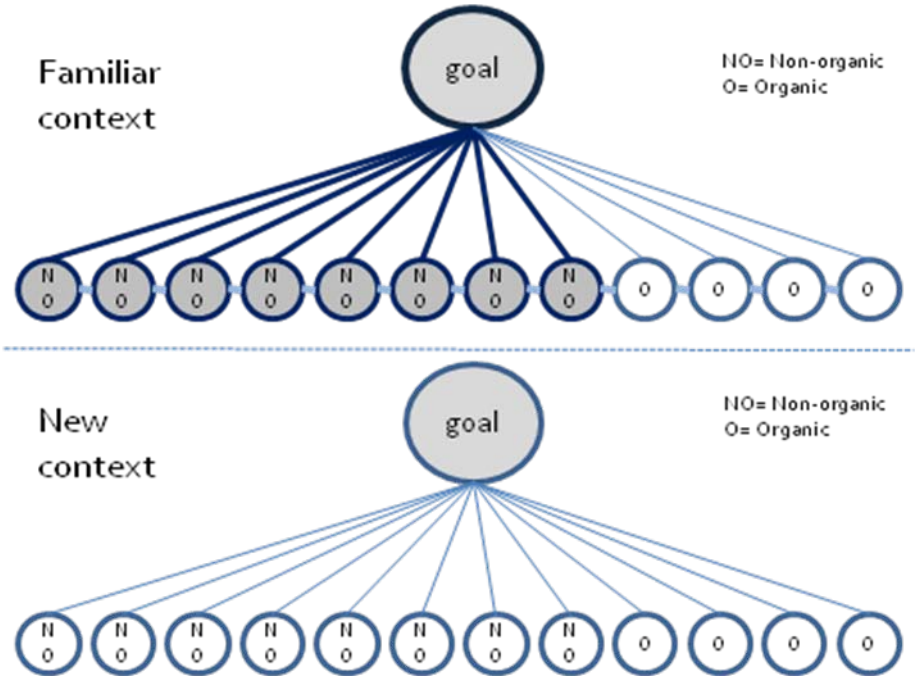
lower and the context becomes unstable. However, this can still be justified in the goal-independent view as an example that goals don't mediate the effect of the situation over behavior but that habits interact with them in various ways to produce behaviors (Wood & Neal, 2007). Thus, although a prediction such as the one we make is not supported in their view, it can still be said that within a familiar situation the decrease in the perceived applicability might be accompanied by goal activation, which could sustain the habitual behavior. Nevertheless, we don't aim to give support to one perspective over another but to demonstrate habit as a dynamic mental representation which can resist to certain changes in the decision context (in this case, in the available options) from one decision to another.

Finally, the presence of this consistency in a familiar context also demonstrates that more than a brand effect, we are in the presence of a motivational effect based on goal activation and the existence of a mentally represented goal structure. Thus, people also choose because there is a non-organic buying habit for a certain product (motivational effect) and not only because there is a habit to buy a specific brand of that product, with the first choice resulting only from a brand priming effect (cognitive effect), i.e., the existence of the habitual brand priming the habit mental representation and biasing the choice towards it. If the latter was the case, consistency wouldn't be expected.

Summarizing, we expect that the presence of means to attain the goal to buy a certain product in a given choice context can increase its accessibility (means prime goals; Kruglanski *et al.*, 2002). This in turn can increase the probability of choosing a non-organic product buying mean, given its predicted co-occurrence with the goal in the past (having been bought or considered for choice) and the existence of an associated mental representation, i.e., given the existence of a non-organic product buying habit. This choice of non-organic product is predicted to be higher in a familiar context than in a new context due to the higher perceived applicability of habit to the former, given an overlap between the means present in

the choice context and the means associated with the goal, which are mentally represented. Not all the means are expected to be equally associated to the goal and some might have a stronger association than the others. Therefore, the probably that they will be chosen is greater, comparing to the others (e.g. in eight available means, three of them can be more strongly associated with the goal). Therefore, even if the habitual mean is not present in the choice context, a similar mean can still be chosen as long it is associated with the habitual mean, in the cognitive goal system (equifinality in goal systems; Kruglanski *et al.*, 2002). A representation of this prediction can be seen in Figure 5.

Figure 5. Goal-means structure representation for each type of context.[8]



[8] Following from Goal Systems Theory (Kruglanski et al., 2002) we infer that the means can have various associations between them. For the sake of simplicity we only represented the associations between pairs of means. However, this should be seen more as a network representation, with connections between all of them. As we said before, this full structure might not be the case for some people. Nevertheless, we infer that, if not all, at least some of the means might be connected.

A second prediction is that this can also happen in a second or even third choice of a different product from the first, which shows that more than a brand effect, we are in the presence of a dynamic mental representation which effects can transfer to other subsequent decisions. In this situation even though the context becomes less stable, given the change in the features essential for choice, i.e., the decrease in non-organic options available to choose from (i.e., less facilitative of a decision associated with habit), the choice of more non-organic in the familiar context compared to the new context can still occur. This is as long as for some participants the existent means still allow for goal attainment i.e., as long equifinality is maintained. Although this might not happen for all people, given the individual differences in the goal system structure, it is expect to happen for most of the people who have a strong habit.

To test our predictions, participants performed a web based study (experimental field study), in which they were asked to choose different products, three times from a list of 4 organic and 8 non-organic milk products, chosen through a pre-test, being randomly assigned to two between-participants conditions: 1) familiar context: high perceived applicability for non-organic milk buying habit; 2) new context: low perceived applicability for the non-organic milk buying habit.

METHOD

PRE-TEST

The pre-test was designed to choose the organic and non-organic products to be used in the choice tasks corresponding to the context's perceived applicability manipulation: familiar context task - national products; new and unfamiliar context task - foreign products unknown to the participants. This was performed in three phases.

Phase 1 - Consumer purchase habits questionnaire. A questionnaire (see Appendix I) was designed in order to assess the food products with stronger habits associated. It was responded by 100 students from *University of Évora* that were given credits for their participation and who provided their informed consent to participate. This questionnaire portrayed them as frequent shoppers, buying food products on an average of 2.06 times per week (*SD* = 1.06); of all the products bought, there was a reported average percentage of 24.62% organic products (*SD* = 24.56).

This questionnaire consisted of the following items: a) identification of the 5 products more often bought by participants (and not by their family, friends or colleagues) in an open-ended question; b) identification of the most frequently bought (1) to the least bought (5) products; c) habit strength assessment for the 2 products bought more often; d) future intention to buy the 2 products bought more often; e) socio-demographic and purchase behavior items (frequency of shopping, percentage of organic products bought; …).

The habit strength measure comprised a translation of the Self-Report Habit Index (Verplanken & Orbell, 2003) to the Portuguese language. This is a questionnaire created to measure habit activation strength, with 12 items in a 7-point Likert type scale (from 1 – "Totally disagree" to 7 – "Totally agree"). According to the authors, this was created in the view that habit is a psychological construct, representing a reliable and valid measure of habit that goes beyond its equation as frequency of behavior and taps into the automaticity features of habit. Therefore, it includes features not only associated with history of repetition (items 1 and 12) but also with how behaviors might reflect a sense of identity or personal style (items 4, 7 and 11) and the automaticity features of behavior, such as difficulty to control it (items 2 and 8), lack of awareness of it (items 3, 5 and 10) and mental efficiency in its performance (items 6 and 9). This measure was applied to a variety of habits, showing content, discriminant and predictive validity in areas such as eating behaviors, physical exercise,

dental flossing, social chatting, negative self-thinking, transportation mode choice and leisure activities (see Verplanken & Orbell, 2003). Thus, this measure taps into the construct we are studying, conceptualizing it in the same way as we. Validity measures regarding our sample, show a very good level of reliability (α = .87) and moderate item-total correlations (with the lowest being .42) for this habit scale.

The intention to buy organic products in the future comprised an adaptation of items based on the Theory of Planned Behavior (TPB; Ajzen, 1991; 2002), with 4 items in a 7-point Likert type scale (from 1 – Completely disagree to 7 – Completely agree). Validity measures regarding our sample show a very good level of reliability (α = .97) and high item-total correlations (with the lowest being .88).

The main results of the questionnaire can be seen in Table 1.

Table 1 - Main results for the "Consumer purchase habits questionnaire"

Top 5 Products	% of report	SRHI – 1st product			SRHI – 2nd product		
		M	*SD*	n	*M*	*SD*	n
Bread	55%	4.11	1.13	22	4.39	1.53	14
Milk	53%	4.91	.96	13	4.61	1.18	18
Yogurt	44%	4.25	1.04	11	4.54	1.12	9
Fruit	42%	6.25	.30	3	4.67	.81	8
Water	33%	4.65	1.09	19	4.33	-	1

Given these results, we chose the milk category for our main study, since that 53% of the participants reported it in the top 5 products frequently bought; there was a moderate to high level on the SRHI (between *M* = 4.91, *SD* = .96 for the participants that chose it as the first product and *M* = 4.61, *SD* = 1.18 for the ones that chose it in the second place); and a

high number of people who chose it in the first (13%) and second place (18%), compared to other products chosen in the top 5.

Phase 2 – Familiar brands questionnaire. A web-based questionnaire was designed in order to assess the milk brands most frequently purchased and more familiar. It was answered by 100 participants through the internet, who volunteered to participate and provided their informed consent. The questionnaire portrayed them as frequent shoppers, buying food products on an average of 1.96 times per week (*SD* = 1.37); of all the products bought, there was a reported average of 14.79% organic products (*SD* = 20.10).

This questionnaire consisted of the following items: a) socio-demographic and purchase behavior items (reported before); b) future intention to buy and other TPB measures regarding organic products - Perceived Behavioral Control; Subjective Norm; Attitude (following from Ajzen, 2002); c) 3 main reasons that prevent people from buying organic products, from the most important to the least (open-ended question); d) recall measure: 3 UHT (Ultra-high-temperature processing) semi-skimmed organic milk products that come to mind (open-ended question); e) recall measure: 3 UHT semi-skimmed non-organic milk products that come to mind (open-ended question); f) brand bought more often from a list of national brands; g) habit strength measure for non-organic products bought in general (SRHI; Verplanken & Orbell, 2003).

The choice of national brands was based on a market study performed by visiting the top Portuguese supermarkets at the time of the study (*Continente; Modelo; Jumbo; Feira Nova; Pingo Doce; Lidl; Dia; El Corte Inglés*), which allowed us to create a list of the 21 brands more frequently available in their shelves. Also, we chose semi-skimmed milk as the target product for our analysis since it is the reported that in Portugal it has a higher frequency of purchase (54%) than skimmed milk (10%) or whole fat milk (36%) (European

Comission, 2007). For the same reason, we chose UHT milk since it is more consumed (65%) than fresh milk (Associação Nacional dos Industriais dos Lacticínios - Anilact, 2007).

Given the length of the questionnaire and since online questionnaires are more prone to drop-outs for this reason (Birnbaum, 2001), we chose to create two questionnaires, one with items a) to f) (see Appendix II) and another with items a), b) and g) (see Appendix III). The first was responded by 60 and the second by 40 individuals.

Results regarding the psychometric properties of measures of future intention to buy and other TPB variables regarding organic products (n = 100), show a very good level of reliability (α = .97) and very high item-total correlations (with the lowest being .93). Regarding the other TPB scales, very good levels of reliability are found for the attitude scale (α = .88; smaller item-total correlation: .61) and moderate levels of reliability for the subjective norm scale (α = .65; smaller item-total correlation: .40) and for the perceived behavioral control scale (α = .66; smaller item-total correlation: .34).

Results regarding the psychometric properties of the habit strength measure for non-organic products bought in general (SRHI) (n = 40), show a very good level of reliability (α = .94) and high item-total correlations (with the lowest being .57). Results regarding it show an overall moderate habit strength regarding non-organic products buying (M = 3.98, SD = 1.63)[9].

In turn, the TPB measures regarding organic products, showed a moderate intention to buy organic products in the future (M = 4.16, SD = 2.02), a moderate to high subjective norm

[9] Given that this measure assessed a habit in a high level of abstraction (non-organic products) and not towards a specific product (e.g. semi-skimmed UHT milk), it is not surprising that this level is moderate, since in this category some products are more habitually bought than others and this might represent an average of that heterogeneity in habits strength.

(*M* = 4.90, *SD* = 1.17) and a high perceived behavioral control (*M* = 5.27, *SD* = 1.20) and a very positive attitude towards buying organic products (*M* = 5.67, *SD* = 1.10).

To what concerns the 3 main reasons (perceived constraints) that prevent people from buying organic products (n = 60), high price (41.80%) and low availability/diversity (23.60%) were the most frequently chosen as the first reason, the second most important reason was again the high price (42.60%) and low availability/diversity (31.50%) and for the third reason (the least important of the three), it was low information available (23.90%) and low motivation (23.9%).

From the recall measure associated with the 3 UHT semi-skimmed organic milk and 3 UHT semi-skimmed non-organic milk products that came to mind and from the measure of the brand bought more often chosen from a list of national brands (n = 60), we chose 12 products: 8 non-organic products and 4 organic products. We opted to choose 12 products (from a list of 21) because it is the standard number of products shown in the homepage of HTML pages developed with the use of the Comersus Cart Software (*Comersus Open Technologies L.C*., 2004), which is the software used to create the webpages for the main study decision making tasks. Also, this is the minimum number of products shown in the *Continente Online Shopping* webpage (*Continente* is one of the supermarkets with the highest percentage of shoppers in Portugal).

Since we didn't want to introduce confound in results by making the choice too difficult with too many options available (and therefore, making a higher demand in terms of cognitive resources and bias the decision for this reason), we decided that this was an acceptable number of options. Moreover, we chose a proportion of .66 for non-organic products (8 in 12) and a proportion of .33 for organic products (4 in 12), based on a market study performed by searching all the Portuguese supermarkets online shopping web pages available, which showed an average proportion of .17 organic products (2/12). To reduce the

possible influence of contrast effects from this small proportion (see Higgins, 1996) but at the same time to maintain a realistic proportion, we increased it to .33 (4/12) for our decision making task in the main study.

The results (n = 60) for the recall and frequency measures for national semi-skimmed UHT milk brands are shown in Table 2, in which the 12 products chosen are the ones with highest results in both measures and therefore, they will be used in the high perceived applicability decision task.

Table 2 - Recall and frequency results for the national semi-skimmed UHT milk brands

Brands	Recall – 1st choice	Recall – 2nd choice	Recall – 3rd choice	Frequency
Mimosa	55%	33.3%	11.1%	45.5%
Matinal	25%	11.1%	11.1%	9.1%
Agros	5%	5.6%	22.2%	9.1%
Terra Nostra	<5%	<5%	<5%	5.5%
Continente	<5%	5.6%	<5%	5.5%
Gresso	5%	11.1%	11.1%	<5%
Vigor	5%	11.1%	11.1%	<5%
Pingo doce	<5%	16.7%	<5%	<5%
*Agros Bio**	<5%	<5%	<5%	<5%
*Purnatur**	<5%	<5%	<5%	<5%
*Président Bio**	<5%	<5%	<5%	<5%
*Andechser Natur**	<5%	<5%	<5%	<5%

* Organic UHT semi-skimmed milk brands

Phase 3 – Unfamiliar brands questionnaire. A questionnaire (see Appendix IV) was designed to pre-test a list of 18 foreign (English) products (brands+images) in a set of consumer related variables, in order to choose 12 semi-skimmed UHT milk products (8 non-organic and 4 organic) equivalent to the domestic ones.

This choice was based on a market study performed by consulting English online shopping web pages for the top supermarkets at the time of the study (*Asda; Waitrose; Sainsbury's; Tesco*), which allowed us to create a list of the 18 brands more frequently available in their online pages.

This questionnaire was responded by 21 individuals who volunteered to participate and provided their informed consent for this. It consisted of the following items: a) association measure for each of the 18 foreign products (first word that came to mind associated with the product); b) attitude towards the brand measured with 4 items on a Likert type 5 point scale (positive-negative; pleasant-unpleasant; good-bad; beneficial-harmful) for each of the 18 foreign products; c) choice frequency: product more probable to buy (from the 18) if the person was in a supermarket where these products were available.

Results for the 18 products are shown in Table 3, in which the 12 products chosen - to be used in the low perceived applicability decision task - are the ones with higher frequency of choice, higher positivity in terms of the attitude towards the brand and with less frequent negative attributes in the association measure. From these, we excluded *Sainsbury's* to prevent any confound to be introduced, since that its organic equivalent - *Sainsbury's Organic* - was excluded given the high frequency of negative attributes. Also, although *Drinks Brokers* had equivalent results to *First Choice* and *Waitrose*, we exclude it since that the negative attributes in the association measure were more negative in content (e.g. bleach; cleaning products) than for the latter.

Table 3 - Pre-test results for the semi-skimmed UHT foreign milk brands

Brand	Mean	Negative attributes frequency	Choice frequency	Products chosen
Nature's way	3.49	2	19%	√
Sainsbury's	3.71	2	14.3%	-
Tiffany	3.40	1	9.5%	√
Drinks Brokers	3.34	3	4.8%	-
Asda	3.30	1	4.8%	√
First Choice	3.30	3	4.8%	√
Piim	3.25	6	4.8%	-
Ultra	3.48	1	0	√
Harvey	3.75	1	0	√
Candia	3.36	7	0	-
Devondale	3.33	1	0	√
Waitrose	3.30	3	0	√
*Heritage**	3.85	1	19%	√
*Sainsbury's O**	3.59	6	9.5%	-
*Moo**	3.60	0	4.8%	√
*Organic Valley**	3.54	3	4.8%	√
*Yeo Valley**	3.30	7	0	-
*Rachel's**	3.26	4	0	√

* Organic brands

MAIN STUDY

Participants and Design. 80 students from the *University of Lisbon* - given credits for their participation, and other participants that volunteered to participate - were offered the possibility of entering a draw to receive 50 Euros in CDs and DVDs, for participating. To participate they had to fulfill the criteria of buying food products for domestic consumption at least once in two weeks. For this reason, the students were requested to bring in their parents or friends that fulfilled these criteria, if they didn't.

The sample consists mainly on young adults, with an overall mean age of 28.16 years old (*SD* = 10.52; *Min* = 19; *Max* = 54) and the majority having a high school degree (60%) or a university degree (27.50%). A questionnaire (see description below) portrays them as frequent shoppers, shopping for food on an average of twice a week (*M* = 2.10, *SD* = 1.28). Also, the sample is characterized by a low percentage of reported organic food products bought in general (*M* = 12.33%, *SD* = 19.85), with 95% of the participants having only 50% or less of the total amount of products they buy being organic products and a medium intention to buy organic food in the future (*M* = 3.44, *SD* = 1.78), portraying them as habitual non-organic food buyers.

Procedure. Participants were asked to take part in two web-based studies, one on "Health and Consumption in Portugal" ministered by the research group in Social and Environmental Psychology and one on "Real and Virtual Shopping Environments" by the research group in Consumer Psychology. These represented two parts of the same study but were presented as such in order to reduce the perceived connection between them. Associated with the first part

Upon providing their informed consent, they received a web page link to perform a web-based questionnaire (see Appendix V) regarding organic and diet products and were told that its aim was to assess the type of decisions people make in web-based environments. This

consisted of the following items: a) socio-demographic and purchase behavior items; and b) future intention to buy organic and diet products (Ajzen, 1991; 2002). Additionally, they were asked to develop implementation intentions (Gollwitzer, 1999) to buy diet products. For this they had to go to a supermarket webstore, in which they had to choose four products and then go back to the questionnaire, inserting them in the provided spaces. Moreover, they had to develop a plan to buy each product on the following week, in terms of "how much" (quantity/weight), "where" (shop/supermarket), and "when" (day of week & time of day/hour) they expected to buy those products.

The questionnaire aim was to present the concept of organic products equally for every participant while making them to believe that this was a general consumer behavior study regarding the web based environment and not the specific products. Thus, we expected that by doing this, the aim of the subsequent decision making tasks would be less explicit and the word organic would be equally accessible to everyone. Moreover, we also wanted to measure the intentions to buy organic food before the task, in order to prevent this question from increasing social desirability at the time of the decision. Finally, this also allowed them to familiarize with the online shopping environment, to be used in the subsequent decision making task given that their familiar environment is the local shop or supermarket and only a small percentage of people buy food products online. Thus, by the time they performed the choice task (see ahead) this environment wouldn't be so new to them and what would be "new" or "familiar" would be related with the products relevant for the decision.

Context applicability manipulation. Two days after this task, participants received an email requesting them to participate in what they thought it was the second study (see Appendix VI). They were provided a link for a study aimed to assess the type of decision people make in web-based environments. This used WebPages for simulation of online shopping, comprising HTML pages developed with the use of the Comersus Cart Software

(*Comersus Open Technologies L.C.* 2004), which is a software package used in the creation of online shopping web pages. The construction of the HTML forms for the storage of the participants data on a web server used *SurveyWiz* (see Birnbaum, 2001), a software used for the development of online surveys.

First, participants were asked to make a written description of what they would do in a situation in which they had to buy bread, fruit and cookies for their weekly breakfasts. This aimed at introducing them to what they thought was the study subject – decisions people make in real and virtual environments. This also aimed to introduce a mind-set (Gollwitzer, 1999) of shopping behavior and thus facilitate the subsequent choices in the following decision making tasks, i.e., to work as a practice task and familiarize them with the subject.

After this, they were given the option to choose one of four different categories of products and told to press one of four buttons for that. However, this was only to allow for a perceived randomness in the attribution of products, increase their motivation and reduce the possible frustration of having only one category of products, with no other available options. Thus, every button led to the same product category: milk. After choosing the category, a page appeared with the "random" category attributed – milk - and the instructions for the decision making task. In these, participants were requested to choose the product they would most probably buy from a list and told that the product would be given to them, after completion of the study. They were also asked to choose two additional options, just in case the first option wasn't available in stock, i.e., their second and third preferences in case the first wasn't available (choose the product they would most probably as "second" and "third"). This procedure involving three choices was based on the one created by Coates, Butler and Berry (2004) to study the effect of priming on the choice of familiar brands.

Following the instruction, the list of products appeared, consisting of 12 UHT Semi-skimmed milk options with 8 non-organic and 4 organic options (proportion of .66 and .33

respectively) showing the price, brand and a picture of the product. Both the familiar and new contexts had the same type of matching products and prices in a fixed position, with the only difference being the product pictures and brand names – Portuguese brands in the familiar context and United Kingdom brands in the new context. The participant's attribution to the familiar or new context tasks (between participant's tasks) followed from their random attribution to the experimental conditions. This derived from a mathematical formula in Microsoft Excel (generation of random numbers between 0 and 1) and sorting of participants email list by column.

Final questionnaire. Finally, after choosing three products from the same list available, participants responded to a short web questionnaire, with manipulation checks and other socio-demographic variables. The first of the manipulation checks asked the level of influence (in a 5-point Likert type scale from "no influence at all" to "strong influence") of a list of factors over the participants decision in the previous tasks, namely: color of the webpage; sound environment; organization of the products on the webpage; distance from the computer; their habitual behavior; price of the products and other factors. The color, sound and distance aspects were inserted only to make the others less "visible". The second check, asked how frequently they buy the 3 brands chosen (1 to 5 scale, from "never" to "four times or more") and the future intention to buy organic products (to retest the intention measure from two days before).

Upon completion of the web questionnaire, participants were thanked for their participation and provided with an email contact in the case they wanted additional information and/or to receive the study results.

RESULTS

Questionnaire and Manipulation Checks. Regarding the baseline characteristics of the sample, the *t*-test for independent samples results show that there are no significant differences between the familiar and new context conditions, in terms of habits perceived influence over the choice, percentage of organic food bought in general, intention to buy organic food in the future and frequency of shopping in general. The only difference found referred to the perceived price influence over the decision to choose the milk products on the decision tasks, with the participants that chose in the familiar context perceiving it as having influenced significantly less their decision (M = 2.95, SD = 1.38) compared to participants in the new context condition (M = 3.92, SD = 1.12), $t(78) = -3.48$, $p = .001$, $d = .78$[10].

Also, participants in the familiar context task reported an average frequency of buying the first product chosen of twice or three times a month (M = 3.70, SD = 1.49), and the second and third on an average of once per month (second product: M = 2.28, SD = 1.13; third product: M = 1.70, SD = .94)[11]. Finally, there were no significant differences between the intention measure in the first and second moment of the study (2 days interval).

Concerning the influence of the products price in the webpage used as the decision task over the decisions made in them, the analysis of the frequency table shows no clear pattern of choosing the products in accordance with their prices (see Table 4).

To further analyze this possibility regarding the influence of the products price, we recoded the data into two categories of products: low price (below .70 Euros) and high price (above .70 Euros). Regarding the choice made in the familiar context or the choice made in the new context, results with the *Binomial test* show no significant differences between the

[10] Cohen's *d* was calculated following from the formula created by Thalheimer and Cook (2002).

[11] On the scale from 1 to 5, the value 1 represented "never" and 5 represented "four times or more".

choice frequencies in the two price categories (high vs. low), in each of the three decisions made.

Table 4 - Choice frequencies for the three decisions made by context, price and webpage position

	Milk brand	Webpage position	Price (Euros)	Frequency of choice 1st choice	2nd choice	3rd choice
Familiar context	*Mimosa*	2	0.59	11	8	7
	Agros	10	0.60	0	1	3
	Seleccionado Matinal	6	0.76	8	7	10
	Terra Nostra	12	0.56	2	1	4
	Continente	5	0.44	7	3	1
	Vigor	11	0.70	6	4	4
	Gresso	3	0.52	3	6	4
	Pingo doce	4	0.40	7	1	3
	*Agros Bio**	9	1.39	5	3	1
	*Purnatur**	7	1.93	0	1	0
	*Président Bio**	1	1.69	2	4	1
	*Andechser Natur**	8	1.70	0	1	2
New context	*Nature's way*	6	0.59	4	0	5
	Tiffany	4	0.60	5	4	6
	Asda	10	0.76	2	3	1
	First choice	12	0.56	0	2	3
	Waitrose	7	0.44	2	3	2

Devondale	11	0.70	2	5	3
Harvey	1	0.52	4	2	6
Ultra	5	0.40	1	4	2
*Heritage organic**	3	1.39	6	4	6
*Organic Valley**	9	1.93	0	2	2
*Moo's organic**	8	1.69	2	5	1
*Rachel's organic**	2	1.70	1	6	3

* Organic products.

Given that the products position in the webpage was fixed between decisions and that this could have introduced a bias in the choice participants made, we performed a check in order to assess it. The analysis of the frequency table shows no clear pattern of choosing the products in accordance with their prices (see Table 4). To further analyze this possibility regarding the influence of products position in the webpage, we recoded the data into two categories of positions: top (aggregating the choice of the 6 products on the webpage's top) and bottom (aggregating the choice of the 6 products on the webpage's bottom). Regarding the overall choice made, results with the *Binomial test* show no significant differences between the choice frequencies in the two position categories.

Regarding the comparison of the choice made in the familiar context and the choice made in the new context, results with the *Chi-square test* show no significant differences between the choice frequencies in the two position categories, for the first and third decision made. To what concerns the second decision, results with the *Chi-square test* show a significantly higher proportion of products chosen in the top in the familiar context (.73) than in the bottom χ^2 (1, N=80) =4.27, p = .033. For the new context no significant differences are found.

Decision Making Task. Binomial test results for the first choice in the familiar context show a significantly higher proportion of non-organic milk chosen (.95) than an expected proportion that would have been obtained by chance (.66) (p = .000; Binomial), with this representing the actual proportion existent in the choice list for the first decision. For the new context, these differences are non-significant.

To what concerns the differences in the non-organic milk choice between the familiar and new context, Fisher's Exact test results show that there is a higher proportion of non-organic products chosen in the familiar context (.95) compared to the new context (.68) (p = .002; Fisher's exact test). The results concerning Fisher's Exact test can be seen in Table 5.

Table 5 - Differences between the familiar and new context choice frequencies with Fisher's Exact test

	Non-organic	Organic	Non-organic proportion.	One-tailed (right)
Familiar context	38	2	.95	p = .002
New context	27	13	.68	

Chi-square test results for the three consecutive choices made in the familiar context show that the decisions made are significantly different from the results that would have been obtained by chance for the dependent events, either associated with the choice in the first decision and then the choice in the second, χ^2 (3, N=40) =23.01, p = .000; associated with the choice in the second decision and then the choice in the third, χ^2 (3, N=40) =23.01, p < .005; and associated with the choice in the first decision and then the choice in the third, χ^2 (3, N=40) =31.00, p = .000. These results can be seen in Table 6. The Chi-square test was based

on the probabilities calculation of choosing by chance in two consecutive choices (e.g., organic in the first choice and non-organic in the second), from four possible combinations (see Appendix VII), in order to determine the expected frequencies and subsequent calculation of the partial chi-squares for each combination.

Table 6 - Differences between choice frequencies for the four combinations of consecutive product choices with the Chi-square test – Familiar context (n=40)

		Choice frequency		Composite Chi-square (df=3)[12]	P
		Expected	Observed		
1st decision vs. 2nd decision	NO-NO	16.8	31	23.01	< .000
	O-O	3.6	2		
	NO-O	9.6	7		
	O-NO	9.6	0		
2nd decision vs. 3rd decision	NO-NO	18.4	29	14.73	< .005
	O-O	4	2		
	NO-O	10.4	2		
	O-NO	10.4	7		
1st decision vs. 3rd decision	NO-NO	18.4	35	31.00	< .000
	O-O	4	1		
	NO-O	10.4	3		
	O-NO	10.4	1		

O = Organic; NO= Non-organic

[12] This was calculated based on the sum of the partial chi-squares associated with each of the four pairs of possible choices. The degrees of freedom were calculated from the number of cells (4) minus 1: df = (N-1).

With respect to the three consecutive choices made in the new context, chi-square test results show that the decisions made are significantly different from the results that would have been obtained by chance, for the dependent events either associated with the choice in the first decision and then the choice in the second, χ^2 (3, N=40) =31.11, $p < .001$; associated with the choice in the second decision and then the choice in the third, χ^2 (3, N=40) =23.01, $p < .001$; and associated with the choice in the first decision and then the choice in the third, χ^2 (3, N=40) =31.00, $p \approx .05$. These results can be seen in Table 7.

Table 7 - Differences between choice frequencies for the four combinations of consecutive product choices with the Chi-square test – New context (n=40)

		Choice frequency		Composite Chi-square (df=3)	P
		Expected	Observed		
1st decision vs. 2nd decision	NO-NO	16.8	22	31.11	< .001
	O-O	3.6	12		
	NO-O	9.6	5		
	O-NO	9.6	1		
2nd decision vs. 3rd decision	NO-NO	18.4	22	22.31	< .001
	O-O	4	11		
	NO-O	10.4	1		
	O-NO	10.4	6		
1st decision vs. 3rd decision	NO-NO	18.4	22	7.61	≈ .05
	O-O	4	7		
	NO-O	10.4	5		
	O-NO	10.4	6		

O = Organic; NO= Non-organic

McNemar's test results regarding the differences between decisions in the familiar context (see Table 8) show a highly significant non-organic consistency (i.e., choice of non-organic milk between two decisions) across the three decisions, with the highest consistency being between the first and third decisions. Moreover, there are a significantly higher percentage of participants which revised their choice between the first and second decisions, choosing organic in the second decision after choosing non-organic in the first decision (17.5%), than the opposite revision (0%) (p = .023; McNemar).

For the other combinations of choices this difference is non-significant, although the same percentage that chose organic in the second decision (17.5%) chose non-organic in the third decision.

Table 8 - Differences in frequencies between decisions in the familiar context with McNemar's test

		Organic	Non-organic	Consistency	McNemar (A/D)	McNemar (B/C)
1st decision (rows) vs. 2nd decision (columns)	Organic	2	0	77.5%	p = .000	p = .023
	Non-organic	7	31			
2nd decision (rows) vs. 3rd decision (columns)	Organic	2	7	72.5%	p = .000	p = .182
	Non-organic	2	29			
1st decision (rows) vs. 3rd decision (columns)	Organic	1	1	87.5%	p = .000	p = .617
	Non-organic	3	35			

Results regarding the differences between decisions in the new context (see Table 9) show a medium consistency in non-organic milk choice between the three decisions (55%), being significant only between the first and third choices (p = .009; McNemar). Moreover, there are no significant differences in the choice revision between decisions.

Table 9 - Differences in frequencies between decisions in the new context with McNemar's test

		Organic	Non-organic	Consistency	McNemar (A/D)	McNemar (B/C)
1st decision (rows) vs. 2nd decision (columns)	Organic	12	1	55%	p = .123	p = .221
	Non-organic	5	22			
2nd decision (rows) vs. 3rd decision (columns)	Organic	11	6	55%	p = .082	p = .131
	Non-organic	1	22			
1st decision (rows) vs. 3rd decision (columns)	Organic	7	6	55%	p = .009	p = 1.000
	Non-organic	5	22			

DISCUSSION

We expected that people wouldn't decide by chance regarding non-organic milk but instead would be influenced by psychological factors and thus choose significantly more non-organic milk in a familiar context as compared to a new context, which wasn't refuted by the results. Also, they show a pattern in which the context's influence over behavior is not direct (S-R responses) but mediated by psychological processes. These go beyond the price and availability of organic food, which usually are considered to be the main reasons underlying the decision to buy organic food. In fact, given that price and availability were maintained

constant between contexts, the differences in results are explained by familiarity (a psychological dimension) rather than these socio-economic factors.

Results regarding the higher choice of non-organic means in the familiar context are in our view, on one side explained by an expected stronger means-goal cognitive association (given a higher frequency of pairing of them in the past) and on another side explained by the fact that in the familiar context there is a higher perceived applicability of the non-organic milk buying habit to the choice context. Thus, not only there is an expected perceived overlap of all or at least some of the means in the decision context with the mentally represented means in the goal system but also some of them - non-organic means - are inferred to have a stronger connection with the goal than others - organic means. Differently, in a new context, the perceived applicability is reduced because this overlap is not expected and differences in the association strength are not expected to exist, given that the non-organic means didn't co-occur in the past with the milk buying goal and therefore alternative means and goals can "find their space". This explains why in spite of means being expected to prime goals in both contexts (increase in goal activation from an increase in accessibility), the effects magnitude is higher in the familiar context, which results from an added source of goal activation: perceived applicability. This effect regarding the principle that "means prime goals" can only be inferred to have had happen following from Goal Systems Theory (Kruglanski *et al.*, 2002), given that we didn't have a goal accessibility measure that could assess the degree of goal activation through mean priming alone (new context) vs. mean priming + perceived applicability (familiar context). Nevertheless, this was not the aim of the study given that we wanted to make this accessibility from mean priming constant between context and study the effect of perceived applicability in addition to it. In fact, our procedure didn't completely rule out the brands effect (brands as means instead of products as means in the new context) as an added source of goal accessibility. This could be done by using artificial brands (see Coates

et al., 2004) instead of real brands but then we wouldn't be studying the perceived applicability effect realistically given that there wouldn't be differences between the new context (English brands) and this artificial context ("artificial" brands), as we conceived them.

Finally, regarding the participants awareness of the processes involved, the decisions weren't attributed directly to habits influence, since a final questionnaire didn't show significant differences in this perception between participants in the two conditions (familiar vs. new context). This supports the view that habits can have an effect outside people's conscious awareness even with supraliminal priming such as in the present study (participants were aware of the connection between the products and their habits) and the involvement of conscious processes based on perceived applicability. Thus, the "visible" aspects like price and availability can sometimes work more as post-hoc justifications for behaviors while the real cause for their decisions – habits – remains "invisible". Additionally, as shown in study 2, for some participant's choices the automatic effect associated with habit accessibility (either for the strong or weak habit participants), interacted with the conscious effect - high perceived applicability in the familiar context - to produce an assimilation effect from both these sources (Higgins, 1996). This is an interesting result given that organic products are for some a socially desirable option, and thus a contrast effect could have been produced from this conscious perception component making participants choose more organics and control their habit, which wasn't the case. For other choices (new context), this accessibility effect occurred "alone", given that the perceived applicability was low and thus, only the strong habit participants demonstrated assimilation effects.

Regarding the consistency between sequential non-organic choices in a familiar context, there were two possible expectations: 1) it maintains itself overtime following from a stable goal system mental representation, which allows for other means to still be available to

achieve the same goal after the first choice – equifinality (Kruglanski *et al.*, 2002); 2) the effect ceases to exist, given that after the goal is fulfilled in the first choice, a decrease in its activation follows (Förster *et al.*, 2005; Förster *et al.*, 2009). Overall, results support the first hypothesis given that the choice proportions were significantly different from chance and the consistency in the choice of non-organic milk over three decisions was above 72.5% in the familiar context and was significantly higher than the consistency in the choice of organic. Thus, the majority of participants were consistent in their non-organic choices, even though changes in the decisional context occurred (in the available options). On the contrary, to what concerns the non-organic choice, although it was also significantly different from chance in the three consecutive decisions made in the new context, the consistency between non-organic choices was lower (55%) and only significant between the first and third choices.

However, it should be taken into consideration that there was a bias towards the choice of non-organic in the three decisions, given that the initial probability of choosing organic and non-organic wasn't the same (see Appendix VII). Also, the probability of revision between choices (choosing a different product from the first) was higher than the probability of choosing organic between choices. Thus, even though the probability of non-organic choice between decisions decreased, in any case it was still higher than the probability of choosing organic (see Appendix VII). Nevertheless, these probabilities were the same for both contexts, and still there were differences that can be explained not by differences in probabilities but by factors associated with the differences between contexts that we mentioned before.

Apart from this, it should also be noted that in the familiar context there are also a small percentage of participants (17.5%) which chose organic in the second decision after choosing non-organic in the first and then chose the same percentage of non-organic in the third decision. One possible explanation for this revision could be that there was some kind of self-

regulation process present, in which people after choosing in a manner consistent with their habit, when confronted with a second choice in the same list, gave more conscious attention to the alternative more socially desired decision options, i.e., gave more conscious attention to the mean to choose organic milk. However, if this was the case, the social desirability effect would also be expected for the decisions in the new context, which is not the case.

Another plausible explanation seems to be that for these participants the goal activation was suppressed after deciding in the first choice (as considered in the second expectation; Förster *et al.*, 2005; Förster *et al.*, 2009) and not activated at the time of the second choice. This might have happened because for these participants none of the means present in the second decision allowed for the non-organic buying goal attainment (no equifinality), i.e., there wasn't an overlap between the means present in the context and the mentally represented means. This may have happened for a small percentage of "extremists" (or brand loyalists), i.e., people that buy the same brand every time and when confronted with its absence, don't buy anything else and don't even look for alternatives. One contradiction is that if this was the case, they wouldn't be supposed to choose non-organic again in the third decision. However, self-regulation involves focalized attention and effort (Fishbach & Shah, 2006) and resources can become depleted, therefore decreasing the ability to proceed with self-regulation (Coelho do Vale, Pieters & Zeelenberg, 2008). This might explain why on the third decision this revision ceased to exist. This is because even though there is the possibility that the available means after the first choice weren't part of their goal system, the resources depletion in the second choice might have made them create a "rule" and follow a decision process based on their first decision: e.g. "When uncertain, choose the closest mean to the one chosen before." Therefore, in the absence of equifinality, they might have performed a means substitution process (Kruglanski *et al.*, 2002), finding means alternative to the habitual mean chosen before. Due to the fact that the highest consistency was found between the first

and third decisions (87.5%), we infer that for these participants this happened on the third decision, while the other participants maintained a choice based on the equifinality structure.

Although the equifinality process can only be inferred, still there is some evidence of this, given that the second and third product were both reported as being bought on an average of once per month (while the first was reported to be bought 2-3 times per month). Nevertheless, we could only assess this explanation if we measured habit strength in this study and an analysis of the revision was done of participants with strong habits. Also, we could analyze if the goal was suppressed after each decision by administering an implicit measure such as the one used by Liberman, Förster and Higgins (2007). This could allow us not only to assess if the revision in some participants was due to goal suppression and at the same time to assess if this activation maintained itself for the participants that were consistent in their choice.

In the new context this consistency was disrupted, given the absence of familiar means to attain the goal, evidencing an overall lower percentage of non-organic choice compared to the familiar context and a choice close to chance in the first decision (which wasn't the case for the familiar context). Nevertheless, consistency was still found for some participants with the same percentage being constant for all consecutive decisions (55%), although this being significantly higher than the organic choice consistency only between the first and third choices. This might be evidence that even in a new context some participants with a chronic highly accessible habit might maintain a choice consistent with their habit, but in this case following a mean substitution process instead of the decision process based on equifinality (Kruglanski *et al.*, 2002), which we infer to have occurred in the familiar context for some participants which revised their choice. This would imply the existence of a non-organic milk buying habit and not a non-organic milk buying habit. However, this can only be inferred in the present study, and our results can't demonstrate clear evidence regarding this.

Lastly, as we said before, we don't aim to support the goal-dependent over the goal-independent perspective. Still it should be noted that although non-organic choice consistency in the familiar context can still be explained by the latter (as we said in this study's introduction), the demonstration of some consistency in the new context as shown above, is more difficult to explain by them. Nevertheless, the demonstration of this is not clear and only future studies can assess this. Independently of the habit perspective, what all these results show is that this might be evidence that the habit discontinuity hypothesis - when a context change disrupts a habit, deliberation becomes more likely (Verplanken *et al.*, 2008) - is not true for all context changes and that habit transference between contexts can occur. This aspect is the aim of the next study.

STUDY 2 – THE ACESSIBILITY + PERCEIVED APPLICABILITY EFFECT

Behavioral goal accessibility is necessary for a habit to be activated and determine behavior under certain conditions (Aarts & Dijksterhuis's, 2000). In study 1 we acknowledged this based on the Goal Systems Theory prediction that *means prime goals* through a bottom-up process (Kruglanski *et al.*, 2002), with context perceived applicability (Higgins, 1989; 1996) adding to this effect. This interaction produced a higher magnitude effect with more non-organic being chosen in the familiar context compared to the choice in the new context (with only mean priming). Accordingly, in a familiar context, this allowed for the goal to prime the non-organic mean consistently over decisions, as represented in the following connection: means >>> goal >>> non-organic-mean.

To further understand the preconditions for habit activation, in study 2 we aim to test this effect with two different categories of means – habitual means vs. non-habitual means (instead of organic and non-organic as in study 1) each associated with a different goal - in the same decision context. One of the reasons is to demonstrate that the results weren't due to

contrast effects (see Higgins, 1996) resulting from the presence of organic means in the context, which could have made participants choose more non-organic options. Differently, it could also be argued that the presence of the organic product mean may have increased the probability that the non-organic mean would be chosen, given that even if they are not frequently bought they still co-occur with the milk buying goal in the decision context. Given this, they are expected to be connected to the same goal to buy milk (see Figure 5), although having a weaker connection. I.e., the organic mean could have also contributed to the activation of the milk buying goal and this in turn increased the activation of the non-organic mean associated with it, given that they were still perceived as applicable although in a lesser degree. If they weren't connected to the same goal, but involved one sub-goal of organic milk buying and one sub-goal of non-organic milk buying connected to a super ordinate goal to buy milk, the critic wouldn't be valid. This is because a horizontal connection between the two sub-goals could be expected (as evidenced in Kruglanski *et al.*, 2002), which implied that by activating the organic milk sub-goal we would inhibit the non-organic milk sub-goal activation. In spite of this, we don't consider the existence of two sub-goals as mentioned, given that the participants reported that most of the products bought were non-organic. If indeed a sub-goal to buy organic milk existed, this would be the case for only a small percentage of the participants and even for those, we infer it would be unstable. This instability would result from an infrequent pairing of it with the organic buying means and an infrequent pursuit of this goal.

To control for these possibilities, in the present study we created a choice task in which the means and goals in "competition" would involve two different goal systems, with an equal proportion for the associated products (.50) to also prevent contextual salience effects. This is because given the fact that organic products had a proportion of .33 in the previous study, it could be argued that this fact made organic products more contextually salient,

which by means of a contrast effect (see Higgins, 1996) could activate the alternative response (non-organic milk buying). The opposite could also be argued and the actual bigger proportion of non-organic would imply a higher contextual salience of the products. Moreover, in study 1, this implied a difference in the choice probabilities, with it being higher for non-organic products. Therefore, by using the same proportion for both products, the same probability of choice exists for both.

Although in study 1 the mean priming of goals was inferred to have remained constant between contexts, the goal priming of means (goal >>> non-organic mean) wasn't controlled for and only inferred to have had an effect in the predicted way. In the present study, we control for the goal priming of means (top-down process; Kruglanski *et al.*, 2002) by exploring the interaction of familiarity with goal accessibility, with the latter being either manipulated artificially (priming) or through a natural (chronic) accessibility (Higgins, 1989).

Hence, we want to assess if the milk buying goal higher accessibility can influence the decision towards the choice of a habitual mean or similar to the habitual (equifinality). The non-habitual means will also be expected to prime the goal associated with the non-habitual choice while the perceived applicability effect is expected to not differ as compared to the same effect for the habitual brands. This is because for the non-habitual product, familiar means will also be used. Thus, the main difference within each context will be the associated goal accessibility which implies the expectance of weaker activation strength for the non-habitual goal compared to the goal associated with the habitual choice, given that the latter's accessibility will be higher (either through priming or chronic accessibility).

Regarding the "artificial" priming, people will be provided with a goal to buy milk in the supermarket in a supraliminal way (motivational priming) rather than a priming of the brand or the product (cognitive priming; for a discussion regarding the different types of priming, see Förster *et al.*, 2009). This is expected to (artificially) increase the accessibility of

the goal-action cognitive link and therefore increase the probability that the habitual mean to attain that goal or a similar mean (equifinality) is chosen when the opportunity arises (Aarts & Dijkertuis 2000; Verplanken *et al.* 1994). The same is not expected to occur when we activate an irrelevant buying goal - e.g. buy bread in the supermarket - since the connection with the mean to buy milk doesn't exist. This effect, however, will depend on context perceived applicability. To what concerns the familiar context, we don't expect differences in terms of habitual products choice but only a replication of the effect found in study 1, i.e., we don't expect accessibility to add to the effect found in study 1, given the presence of a ceiling effect (expecting that this effect adds to the other accessibility sources and leads to a close to 100% choice of milk is very unlikely and it is not realistic).

Given this, our main prediction concerns the new context. Specifically, we want to assess a prediction found in mental constructs accessibility research (but not in habit research), following from Higgins and Brendl (1995) activation rule 1: *Strong accessibility can compensate for weak applicability*. Thus, we hypothesize an accessibility effect can occur even when perceived context applicability is low, resulting in a consistency in the choice between the new and the familiar context (as predicted for the three choices in study 1), i.e., when the target goal is primed before the decision, participants in the new context can follow the same decision process as the one's in the familiar context. The same is not expected to happen when an irrelevant goal is primed, given that as shown in study 1 the accessibility from mean priming is not sufficient to produce an effect over the decision, compared to the one found for the familiar context. For these participants, consistency between contexts is not expected but revision between them is, with more choice of habitual products in the familiar context than in the new, i.e., their choice will be determined by the context based on the perceived applicability of habit to it.

It should be noted however that we use this rule as a basis for testing the idea that habits are dynamic mental representations and not as a direct test of the rule, given that we are assessing the effect of perceived applicability and not of actual applicability as Higgins and Brendl (1995)[13]. Nevertheless, given the state of the literature on habits, what we want to assess will be more useful for the existent lines of research, given that it can show that other sources of habits activation beyond perceived applicability (Wood *et al.*, 2005) can influence habits activation and translation into behavior. By showing the effect of habit even in a condition of low perceived applicability, as long as accessibility either from priming or chronicity is high, will allow that.

We expect this to occur because, although perceived applicability is lower in the new context, this context is not completely new given that even if the familiar means don't exist, the products (milk and orange juice) are still familiar. Thus, there can still be a bias toward the product regardless of the brand and even in the absence of the familiar brands a mean substitution process can still occur (Kruglanski *et al.*, 2002). The reason is that, although perceived applicability is expected to be lower in a new context, the habit might still be perceived as applicable to the existent products, instead of to the brands, i.e., although brands are not present habit can still be followed because the product is present.

We infer that this perception should only take place if the habit is activated following from the goal or chronic accessibility, i.e., these participants should be the ones to resist the context changes. This implies that participants for which a relevant goal is primed can still choose the habitual product by substituting the habitual or equifinal means for an unfamiliar mean (though familiar product), as long as the latter allows for the attainment of their goal. If an irrelevant goal is primed, this effect is not expected to occur, given that the goal to buy milk won't be activated and thus, doesn't need to be pursued and attained.

[13] I.e. we want to assess this effect mediated by perception and not the automatic effect from applicability.

Following from this, we aim to test the argument advanced in study 1 that the habit discontinuity hypothesis doesn't hold for every context change and there might be some contexts for which habit transfer might occur, if habit is strong enough (i.e., highly accessible) and certain "essential" contextual features still allow for it to influence choice. Consequently, the goal is expected to be accessible in both contexts and a decision process involving means substitution can still occur (Kruglanski *et al.*, 2002) instead of not attaining the goal due to the absence of familiar means. This should be evidence of the occurrence of goal activation for both contexts and thus, a demonstration of habits dynamic properties, also found for other mental representations such as stereotypes for example (see Garcia-Marques, Santos & Mackie, 2006).

This same effect is expected to occur for participants naturally strong in their milk buying habits, i.e., participants with a high chronic accessibility (Higgins, 1989; 1996) in their milk buying habits will choose habitual products more consistently between contexts. Regarding this, automaticity research has shown that chronic and temporary constructs have the same effects in short intervals between priming and judgment, although the chronic ones are more powerful in longer intervals (Bargh, 1997; Bargh *et al.*, 1988).

Therefore, we expect an accessibility effect either from an artificial increase in the accessibility (goal priming) or from an already high natural accessibility, given that both types are expected to have the same consequences in terms of an immediate response.

A graphical representation of these predictions regarding the accessibility effect, either in terms of main or interaction effects with the context can be seen in the following Figures 6 and 7.

Figure 6. Goal-means structure representation given an (artificially or naturally) highly accessible goal to buy milk, for each context

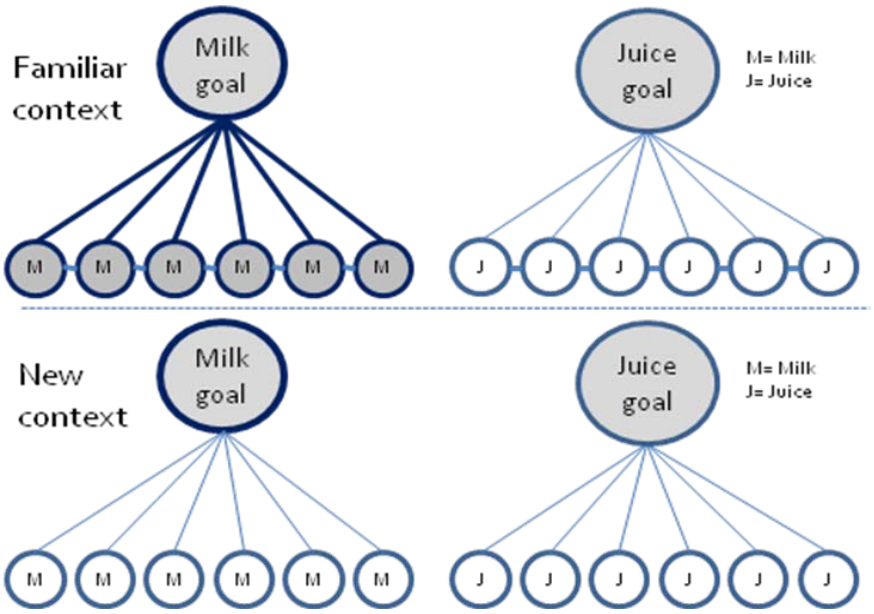
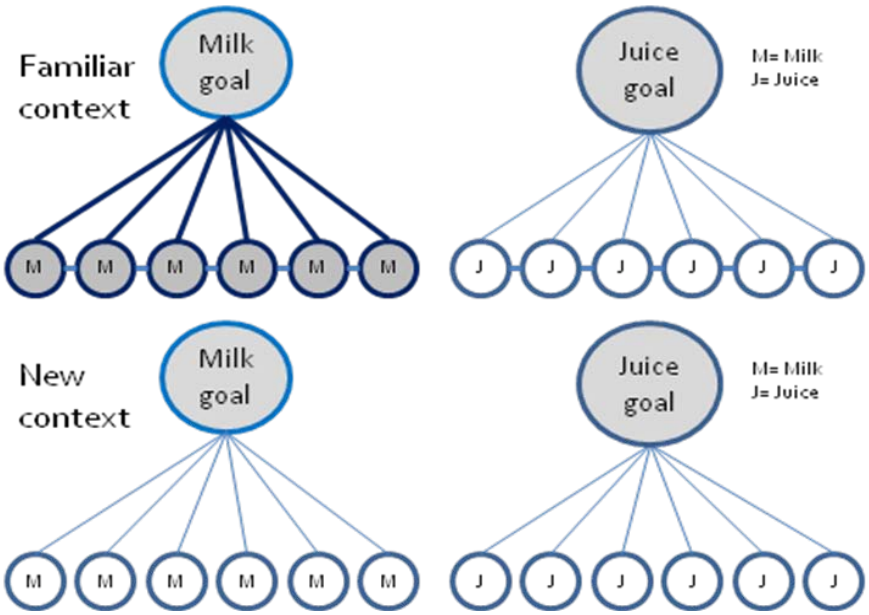


Figure 7. Goal-means structure representation given an (artificially or naturally) lowly accessible goal to buy milk, for each context



To assess the predictions regarding the "artificially" increased accessibility, participants were randomly assigned to two within and two between participants conditions respectively, in an experimental design as follows: 2 (familiar context: high perceived applicability for milk buying habit vs. new context: low perceived applicability for milk buying habit) X 2(accessible target (bread+**milk**) buying goal vs. accessible irrelevant (bread+water) buying goal). To evaluate the predictions regarding the "chronic" accessibility, participants were randomly assigned to four within-participants conditions, in an experimental design as follows: 2 (familiar context: high perceived applicability for milk buying habit vs. new context: low perceived applicability for milk buying habit) X 2(strong vs. weak habit participants).

METHOD

PRE-TEST

The pre-test was designed to choose the non-habitual products to be used in the choice tasks corresponding to the context's perceived applicability manipulation: familiar context task - national products; new and unfamiliar context task - foreign products unknown to the participants. Following from the *Consumer purchase habits questionnaire* in study 1 (pre-test), one habitual product and one non-habitual product were chosen.

For the habitual product, we chose the milk category for the same reasons we chose it for study 1. The familiar (national) and new (foreign) milk brands were chosen from the 8 non-organic milk brands used in study 1, being chosen the 6 that had higher frequency of buying and level of recall (on the first, second and third choices; see pre-test from study 1).

For the non-habitual product, we chose the orange juice category, since it was chosen in the top 5 products in an infrequent way (2% in the first choice and 3% in the second) and

with a small overall proportion (17%)[14]. This category was also chosen in order to have familiar (domestic) and new (foreign) brands, in order to control for the influence of a brand effect over the results and to have a category similar to the habitual products category (both are beverages). In order to choose the orange juice brands to be used in the main study, we performed a pre-test with two phases.

Phase 1 – Familiar brands questionnaire. A questionnaire (see Appendix VIII) was designed in order to assess the orange juice brands most frequently purchased and more familiar. It was answered by 53 participants who volunteered to participate and after providing their informed consent, received a questionnaire on "Consumer behavior in Portugal" by email and were asked for it to be sent back through the same way to the researcher after responding to it.

This questionnaire consisted on the following: a) recall measure: all the orange juice products that came to mind (open-ended question); b) ordering of the brands in the previous measure from the most important to the least important; c) frequency of consumption: brand bought more often from a list of domestic brands (on a scale from 1- never to 5 - always). This choice was based on a market study performed by visiting the top Portuguese supermarkets at the time of the study (*Continente; Modelo; Jumbo; Feira Nova; Pingo Doce; Lidl; Dia; El Corte Inglés*), which allowed us to create a list of the 18 brands more frequently available in their shelves.

[14] This percentage can be even smaller, considering that these percentages refer to fruit juices in general, although orange juice is reported as the type of juice most frequently consumed. Also, we cannot report here the results regarding the SHRI for this category, since the SHRI referred only to the first two products people chose, which implies a very small N for this category (5).

Results for these measures regarding the domestic orange juice brands are shown in Table 10, in which 6 products were chosen, being the ones with the highest results in both measures. These are the products that were used in the high perceived applicability task.

Table 10 - Recall and frequency results for the national orange juice brands

Orange juice brands	Recall – 1st choice	Recall – 2nd choice	Recall – 3rd choice	Frequency	
				M	*SD*
Compal	52.9%	17.6%	5.9%	2.88	1.06
Sumol	5.9%	17.6%	23.5%	2.19	1.17
Santal	<5%	11.8%	11.8%	1.94	1.02
Sunny Delight	<5%	<5%	5.9%	1.52	.92
Ceres	<5%	<5%	5.9%	1.42	.80
Fresky	5.9%	<5%	<5%	1.35	.71

Phase 2 – Unfamiliar brands pre-test. A questionnaire (see Appendix IX) was designed to pre-test a list of 9 foreign (English) products (brands+images) in a set of consumer related variables, in order to choose 6 orange juice products equivalent to the domestic ones. This choice was based on a market study performed by consulting English online shopping web pages for the top supermarkets at the time of the study (*Asda; Waitrose; Sainsbury's; Tesco*), which allowed us to create a list of the 9 brands more frequently available in their online pages. The questionnaire was responded by 17 individuals who volunteered to participate and provided their informed consent for this. It consisted on the following items: a) percentage of preference for each type of orange juice bought, in terms of production process (100% juice; from concentrate; fresh); b) association measure for each of the 9 foreign products (first word that came to mind associated with the product); c) attitude towards the brand measured with 4

items on a Likert type 5 point scale (positive-negative; pleasant-unpleasant; good-bad; beneficial-harmful) for each of the 9 foreign products; d) choice frequency: product more probable to buy (from the 9) if the person was in a supermarket where this products were available.

Results for the 9 products are shown in Table 11, in which the 6 products chosen - to be used in the low context perceived applicability task - are the ones with higher frequency of choice, higher positivity in terms of attitude towards the brand and with less frequent negative attributes in the association measure.

Table 11 - Pre-test results for the semi-skimmed UHT foreign milk brands

Orange juice brands[15]	*M*	Negative attributes frequency	Choice frequency	Products chosen
Del Monte	3.53	1	17.6%	√
Sainsbury's	3.52	2	17.6%	√
Innocent	3.63	2	11.8%	√
Libby's	3.38	3	5.9%	√
Grove	3.50	2	5.9%	√
Morrisons	3.23	1	<5%	√
Waitrose	4.09	1	41.2%	-
Costa	3.19	4	<5%	-
Don Simon	3.00	5	<5%	-

[15] From this list, the brand *Waitrose* was excluded to prevent a bias toward choosing it, since that its frequency of choice was very high comparing to the highest frequency found for the foreign milk products (19%). Thus, to maintain some equivalence between orange juice and milk foreign products, we didn't include it in the main study decision task.

MAIN STUDY

Participants and Design. 160 students from the *University of Évora* - given credits for their participation, and other participants that volunteered to participate - were offered the possibility of entering a draw to receive 50 Euros in CDs and DVDs, for participating. To participate they had to fulfill the criteria of buying food products for domestic consumption at least once in two weeks. The sample consisted mainly on young adults, with an overall mean age of 25.53 years old (*SD* = 7.56; *Min* = 18; *Max* = 60) and the majority having a high school degree (56.90%) or a university degree (33.10%)[16].

Procedure. Participants were asked to take part in a web-based study on "Real and virtual shopping environments". After providing their informed consent, they performed a task with the aim of accessing the types of decisions people make in supermarkets, which represented the goal accessibility manipulation.

Goal priming task. Participants were randomly attributed to one of two goal accessibility tasks (between participants tasks) following from a Java function added to the HTML code source. The ones in the milk buying goal accessibility condition (see Appendix X) were asked to write a brief description of their behavior in a certain situation (following from Gaspar de Carvalho, 2006), after being presented with a practice example: *"Imagine that you need to go shopping for the week's breakfasts or lunches in your house and in order to do that you go to the nearest supermarket/local store. Once you get there, you decide to buy bread and milk. Please describe what you would do from the time you arrive at each*

[16] The participants of the *University of Évora* are the same as in the *Consumer purchase habits questionnaire* from study 1 (pre-test) and therefore the sample characteristics regarding them are the ones presented there. Regarding the other participants, the questionnaire in the present study didn't assess the frequency of buying behaviour and other consumer characteristics. Still, this shouldn't be a problem since the criteria to participate in this study clearly stated that they had to buy food products for own consumption at least once in two weeks.

product section in the supermarket/local store, until the time you choose what you want to take, writing in the space below the options available in there and the way you make your choice for each of the two products." They were asked to write this description as if it were a short story and not as topics or a list of steps to do. Each product had its own blank space, starting with the irrelevant product, followed by the target product.

The participants in the irrelevant buying goal accessible condition performed the same task but with milk being substituted with water[17]. Bread and water were chosen given that they had a frequency of choice and SRHI levels similar to milk. Thus, we aimed to activate the bread and water buying goals (and associated habits) but only the milk goal had the opportunity to be attained, given that the subsequent task had a list of milk and orange juice products to choose from.

The idea here is that, priming stimulates or activates the stored knowledge (Higgins, 1996) and thus providing people with a behavioral goal (buy milk for the week's breakfasts or lunches), should increase its accessibility (and consequently, the mental representation of the associated habit). This in turn should increase the probability of being automatically used (choose the habitual milk) when the opportunity arises (i.e., the appropriate stimuli are presented). This opportunity is only given for the milk goal and not to the water and bread goal, since the decision tasks only have products of the former category and from a category for which a goal wasn't made accessible (orange juice). Finally, in order to demonstrate the accessibility effect, our aim was also to make the milk buying goal more accessible than an alternative construct (orange juice) which is equally applicable in the subsequent decision making task (Higgins, 1996).

[17] This goal priming procedure was similar to the one used in study 1, although the one used there (for bread, cookies and fruit) and the one used here (for water and bread), both represent control manipulations given that the relevant goal for the subsequent decision tasks(milk) is not primed in both.

This was done through supraliminal goal priming - participants are expected to be aware of the stimuli presentation but not of its effect over their choices (Bargh & Chartrand, 2000). By using this, we departed from previous studies which use subliminal goal priming (Aarts & Dijksterhuis, 2000), with the aim of testing a new methodology for goal priming and at the same time assessing if this methodology could replicate the results obtained with subliminal priming. The reason for this is that the type of supraliminal priming we use might be valuable to the study of self-regulation processes in the control of the habitual response that involve elaborate information processing strategies (e.g. implementation intentions; see Gollwitzer, 1999), given that it might be more practical to use it in a consumer behavior change intervention than other types of subliminal priming (e.g. Aarts & Dijksterhuis, 2000).

Context applicability manipulation .After this task, participants were requested to participate in a decision making task with the same type of WebPages used in study 1 and with the same procedure (see Appendix XI). The main difference from this was that the context perceived applicability manipulation was that participants had to perform both applicability tasks (within-subjects). Thus, in the high perceived applicability task, participants were asked to: “Imagine that you are at your house and have to prepare breakfast or lunch”. Following this they were asked to choose the product they would most probably buy in that context. In the low perceived applicability task, people were asked to: “Imagine that you are at a friend’s house in another country and have to prepare breakfast or lunch”. Again, they were asked to choose the product they would most probably buy in that context and as in study 1, they were told that the products would be given to them after completion of the study. The appearance of the products in the pages and the attribution to the high-low or low-high perceived applicability orders was random, following from a Java function added to the HTML code source.

The list of products consisted on 6 options of UHT Semi-skimmed milk and 6 options of 100% Orange Juice (50/50 proportion) showing the price, brand and a picture of the product for each. Both the familiar (high perceived applicability) and new (low perceived applicability) contexts had the same type of products and matched prices, with the only difference being the product pictures and brand names – Portuguese brands in the familiar context and English brands in the new context. The appearance of the products in the pages was random, following from a Java function added to the HTML code source.

It should also be noted that before having the decision making tasks, as for study 1, participants were given the option to choose one of four different categories of products and told to press one of four buttons for that, with every button leading to the same product category: milk. Apart from the reasons for using this procedure mentioned in study 1, the appearance of the "milk" word also allowed to control the cognitive activation of the milk category and rule out the influence of a bias from a semantic activation effect. Thus, independently of having been primed with the goal to buy milk or not (in the goal accessibility manipulation task)[18], every participant was primed with the "milk" word and thus, differences in results should result from the goal primed and not from the word primed.

Final questionnaire. Finally, participants responded to a short web questionnaire, with socio-demographic variables, a SRHI measure for milk and orange juice buying habits (Verplanken & Orbell, 2003) and future intentions to buy milk and orange juice (Ajzen, 1991; 2002). Results regarding the psychometric properties of the habit measure, show a very good level of reliability for the milk habit measure (α = .93) and high item-total correlations (with the lowest being .60); and a very good level of reliability for the orange juice habit measure (α = .95) and moderate item-total correlations (with the lowest being .47). Results regarding the psychometric properties of measures for the future intention to buy, show a

[18] Participants in the irrelevant goal condition weren't presented the word "milk" but with "bread" and "water".

very good level of reliability for the future intention to buy milk scale (α = .91) and high item-total correlations (with the lowest being .72) for this; and a very good level of reliability for the future intention to buy orange juice scale (α = .96) and high item-total correlations (with the lowest being .85) for this.

Apart from characterizing the sample in terms of milk and orange juice buying habits, this SRHI measure also allowed the determination of two groups of participants – strong vs. weak milk buying habit - based on the lowest (Q = 3.37) and highest quartiles (Q = 5.42), associated with the 7 point Likert type scale. Given that this is a questionnaire created to measure habit activation strength, we considered that participants with values below the lowest quartile have a weak habit and participants with values above the highest quartile have a strong habit (see Verplanken and Holland (2002) for a similar procedure). Thus, we inferred that the behavior of participants with high values on this measure is performed frequently, with high efficiency, reduced control and awareness, and it is part of their identity or personal style (Verplanken & Orbell, 2003). Consequently, we consider this might indicate that strong milk buying habits participants are also chronic to what concerns this mental construct, given that chronic accessibility is considered to be associated with automatic processing (Higgins, 1989; Higgins, 1996). We could be more certain about this inference if we had a response frequency measure of habit, a type of implicit measure which assesses response latency and other aspects that demonstrate the cognitive association strength between goals and actions (Aarts & Dijksterhuis, 2000). However, SHRI convergent validity studies show that this measure correlates strongly with response frequency measures of habit (Verplanken & Orbell, 2003; study 2) and thus, we think this inference is admissible.

After completion of the web questionnaire, participants were thanked for their participation and provided with an email contact in the case they wanted additional information and/or to receive the study results.

RESULTS

Questionnaire and Manipulation Checks. Regarding the baseline characteristics of the sample, there is an overall moderate habit strength to what concerns milk buying (M = 4.27, SD = 1.42), which the paired-samples t-test shows as overwhelmingly significantly higher that the orange juice habit strength (M = 2.41, SD = 1.37), $t(159) = 12.00$; $p = .000$. Regarding the future intention to buy the products, there is a very high intention to buy milk in the future (M = 6.24, SD = 1.33), which the paired-samples t-test shows as overwhelmingly significantly higher than the intention to buy orange juice in the future (M = 4.05, SD = 2.03), $t(159) = 10.81$, $p = .000$.

The independent-samples t-test results show no significant differences between the two goal priming conditions in the SRHI for milk and orange juice and in the intentions to buy orange juice and milk in the future. Regarding the two chronic accessibility conditions (strong vs. weak habit), the independent samples t-test results show no significant differences between these conditions in the SRHI and intentions to buy orange juice and in the level of influence of habit and price over the participants decision. Significant differences were found for the intentions to buy milk in the future (strong habit: M = 6.80, SD = .44; weak habit: M = 4.86, SD = 1.94), $t(77) = 6.10$, $p = .000$, $d = 1.40$.

The comparison of the SRHI results for the milk buying habit between the pre-test from study 1 (M = 4.80, SD = 1.10) and the present study (M = 5.38, SD = 1.00) performed one month after it, show a significant increase in habit strength $t(159) = -3.20$, $p = .004$, $d = .56$, and a strong positive and highly significant correlation between these two measures ($r = .59$; $p = .001$). It should be noted that these results concerns an n of 28 participants which were the ones that in the pre-test of study 1 chose milk as the most frequently bought products or the second most and which also participated in the present study. Therefore, this can be

considered a small test-retest measure of the SHRI. The fact that there was an increase might be attributed to the performance of a task regarding the choice of milk prior to answering (but not to the accessibility manipulation, given that there were no SHRI differences between the associated conditions). However, we don't expect it to introduce a confound in the results given that this increase was for participants that were part of every condition of the experimental design. Thus, if a confound exists it was introduced in every condition and thus doesn't bias each of them individually.

Regarding order effects, results from the *Fisher's exact test* applied to *Gart's test for order effects* (see Everitt, 1977) show no differences between the familiar-new or new-familiar task orders.

Decision Making Task. Chi-square test results for the consecutive choices made in the familiar and new context show that the decisions made are significantly different from the results that would have been obtained by chance for the independents events, either in the irrelevant goal condition, χ^2 (3, N=80) =22.60, p = .000; the target goal condition, χ^2 (3, N=80) =19.30, p = .000; for the strong habit participants, χ^2 (3, N=39) =26.54, p = .000; or for the weak habit participants, χ^2 (3, N=40) =16.80, p = .000 (see Appendix VII for the chance probabilities calculation, which served as basis for calculating the expected frequencies in the *Chi-square test*).

McNemar's test results regarding the differences between decisions in the familiar and new context when the target goal is accessible (see Table 12) show a significantly higher percentage of participants which revised their choice, by choosing the non-habitual product (orange juice) in the new context and the habitual (milk) in the familiar context (23.75%) as compared to the opposite revision (3.75%) (p = .001; McNemar). Regarding the consistency between contexts, it is not significant in this accessible target goal condition.

Table 12 - Differences in frequencies between decisions in the new and familiar context with the accessible target goal with McNemar's test

		New context			
		Non-hab.	Hab.	McNemar (A/D)	McNemar (B/C)
Familiar context	Non-hab.	29	3	$p = .896$	$p = .001$
	Hab.	19	29		

McNemar's test results regarding the differences between decisions in the familiar and new context when the irrelevant goal is accessible (see Table 13) show a significantly higher percentage of participants which revised their choice, by choosing the non-habitual product in the new context and the habitual in the familiar context (32.5%) compared to the opposite revision (6.25%) ($p = .000$; McNemar). Moreover, in this condition there is a higher choice consistency for the habitual (38.75%) than for the non-habitual products (22.5%) between contexts, although this difference is marginally significant.

Table 13 - Differences in frequencies between decisions in the new and familiar context with the accessible irrelevant goal with McNemar's test

		New context			
		Non-hab.	Hab.	McNemar (A/D)	McNemar (B/C)
Familiar context	Non-hab.	18	5	$p = .087$	$p = .000$
	Hab.	26	31		

McNemar's test results regarding the differences between decisions in the familiar and new context for the strong habit participants (see Table 14) show a higher choice consistency for the habitual (58.97%) than for the non-habitual products (12.82%) between contexts (p = .000; McNemar). Regarding the revision between contexts, there are no significant differences.

Table 14 - Differences in frequencies between decisions in the new and familiar context for the strong habit participants with McNemar's test

		New context			
		Non-hab.	Hab.	McNemar (A/D)	McNemar (B/C)
Familiar context	Non-hab.	5	2	p = .001	p = .070
	Hab.	9	23		

McNemar's test results regarding the differences between decisions in the familiar and new context for the weak habit participants (see Table 15) show a significantly higher percentage of participants which revised their choice, by choosing the non-habitual product in the new context and the habitual in the familiar context (45%) compared to the opposite revision (0%) (p = .002; McNemar). Regarding the consistency between contexts, there are no significant differences.

Table 15 - Differences in frequencies between decisions in the new and familiar context for the weak habit participants with McNemar's test

		New context			
		Non-hab.	Hab.	McNemar (A/D)	McNemar (B/C)
Familiar context	Non-hab.	18	0	p = .186	p = .002
	Hab.	12	10		

Results regarding the interaction between the goal priming conditions and habit strength (see Table 16) show no significant effects for the strong habit participants in the accessible target goal condition. In the same condition for the weak habit participants there is a marginally significant higher percentage of participants which revised their choice, by choosing the non-habitual product in the new context and the habitual in the familiar context (21.74%) compared to the opposite revision (0%) (p = .074; McNemar).

For the strong habit participants in the irrelevant goal condition, results show a higher choice consistency for the habitual (66.67%) than for the non-habitual products (4.76%) between contexts (p = .002; McNemar). Results regarding the weak habit participants in the same condition show a significantly higher percentage of participants who revised their choice, by choosing the non-habitual product in the new context and the habitual in the familiar context (41.18%) as compared to the opposite revision (0%) (p = .023; McNemar).

Table 16 - Differences in frequencies between decisions in the new and familiar context for the interaction between the goal priming conditions and habit strength, with McNemar's test

		Strong habit + target goal			
		New context			
		Non-hab.	Hab.	McNemar (A/D)	McNemar (B/C)
Familiar context	Non-hab.	4	1	$p = .267$	$p = .371$
	Hab.	4	9		
		Strong habit + irrelevant goal			
		New context			
		Non-hab.	Hab.	McNemar (A/D)	McNemar (B/C)
Familiar context	Non-hab.	1	1	$p = .002$	$p = .221$
	Hab.	5	14		
		Weak habit + target goal			
		New context			
		Non-hab.	Hab.	McNemar (A/D)	McNemar (B/C)
Familiar context	Non-hab.	10	0	$p = .814$	$p = .074$
	Hab.	5	8		
		Weak habit + irrelevant goal			
		New context			
		Non-hab.	Hab.	McNemar (A/D)	McNemar (B/C)
Familiar context	Non-hab.	8	0	$p = .114$	$p = .023$
	Hab.	7	2		

Finally, in order to further understand the type of decision process involved in the participant's decisions, a binary logistic regression was performed with the scales assessing milk habit and the intentions to buy milk in the future as independent variables and the choice of habitual vs. non-habitual products for each context as the dependent (thus implying two logistic regressions). According to Baron and Kenny (1986, p. 1177), "Mediation holds if the independent variable has no effect on the dependent variable when the mediator is controlled". Therefore, to assess the role of habit as a mediator of the choices in each context, we introduced it in the first step of the logistic regression to control for its effect and both habit and intention in the second step (Aarts, Dijksterhuis & Midden, 1999).

Results regarding the binomial logistic regression for the familiar context (see Table 17), show that habit is a significant positive predictor of choice (B_{habit} = .37, X^2_{Wald} (1) = 8.65, p = .003) in a model with only habit as a predictor at step 1. Overall, the model obtained produced a low but reasonable fit to the data (p (-2LL) = .02, $X^2_{HL}(8) = 15.52$ p = .05, R^2_{CS} = .06, R^2_N = .078, R^2_{MF} = .05), with the percentage of cases correctly identified with it being 14.53% higher than the one's identified by chance. Moreover, results show that a one unit increase in the habit scale increases the chances ratio of choosing the habitual product in 44%. The omnibus test shows that the introduction of the intention measure at step 2 doesn't improve significantly the model (G^2 = .43, p = .51).

Results regarding the binomial logistic regression for the new context (see Table 17), show that habit is a significant positive predictor of choice (B_{habit} = .47, X^2_{Wald} (1) = 13.29, p = .000) in a model with only habit as a predictor at step 1. Overall, the model obtained produced a low but reasonable fit to the data (p (-2LL) = .02, $X^2_{HL}(8) = 13.86$ p = .09, R^2_{CS} = .09, R^2_N = .12, R^2_{MF} = .07), with the percentage of cases correctly identified with it being 11.34% higher than the one's identified by chance.

Moreover, results show that a one unit increase in the habit scale increases the chances ratio of choosing the habitual product in 59.4%. The omnibus test shows that the introduction of the intention measure at step 2 doesn't significantly improve the model ($G^2 = .43$, $p = .51$).

Table 17 - Summary of the binary logistic regression for variables predicting the choice of the habitual product in the familiar context (n = 80) and new context (n = 80)

	Variable	B	*SE* B	Wald	Exp(B)
Familiar context	Step 1				
	Habit	.37	.13	8.65*	1.44
	Step 2				
	Habit	.31	.16	3.87*	1.36
	Intention	.10	.16	.43	1.11
New context	Step 1				
	Habit	.47	.13	13.29**	1.59
	Step 2				
	Habit	.44	.15	8.19*	1.55
	Intention	.06	.18	.12	1.06

** Result significant at p<.05*
*** Result significant at p<.001*

DISCUSSION

To what concerns the interaction between perceived applicability and chronic goal accessibility, the results didn't refute our hypothesis and demonstrated that other factors intervened in the decisions, other than chance. Results showed that the majority of the strong

habit participants chose the habitual product consistently between contexts, i.e., as expected chose the habitual product in the familiar context but also chose the habitual product in the new context. Differently, the decisions of participants with weak habit were consistent with the context, with the majority choosing more the habitual product in the familiar context and the non-habitual product in the new context. Given their weak habit, their mental representation is inferred to be more unstable than for the strong habit participants. Thus, given this instability, they are influenced by the context changes associated with a reduction in perceived applicability, constraining the decision process associated with the habitual product. At the same time, the stability is "aided" by the context, with the weak chronic accessibility being compensated by the high context perceived applicability. In addition to this, the logistic regression results show that in the familiar context but also in the new context, the measure of milk buying habit was a better predictor of the choices than the measure of intention to buy milk in the future, which supports the idea that even in the new context, an automatic decision process might have also occurred.

Although this is inferred to have happened for almost the majority of the weak habit participants (45%), there is some heterogeneity in the results, which might indicate that even within the groups, there are some differences between participants. A marginally non-significant percentage of the strong habit participants also revised their choice in accordance with the context, which we infer that is also a demonstration of heterogeneity within this group, i.e., some participants in the strong habit group might have weaker mental representations than others and thus, chose the non-habitual product in the new context and the habitual in the familiar.

Accordingly, due to the fact that we created the two strong and weak habit groups based on the lowest and highest quartiles on the SHRI results, it is admissible that the weak habit group (lowest quartile) for example, includes either participants with no habit at all and

participants with a weak habit. Thus, this result regarding choice revision consistent with the context is considered to have had happened for the weak habit participants and not for the participants with no habit at all. This would explain why this happened for only 45% of the weak habit participants. Moreover, there are a non-significant percentage of participants which chose consistently the habitual product. This is not surprising given that even though the milk buying habit is weak, it is stronger than the orange juice buying habit. Despite of this, overall there is evidence that even in the absence of familiar brands the presence of the familiar product (milk) can still be enough for the choice of the habitual product by people with a strong habit to remain consistent between contexts, supporting the idea that *strong accessibility can compensate for weak (perceived) applicability* (Higgins & Brendl, 1995).

Moreover, the results of this study compared to study 1 results, evidence that the priming of goals through means occurs regardless of a contrast effect resulting from the context (see Higgins, 1996), associated with the presence of organic products. This also occurs even when we take out the possible effect that the organic milk mean would have in terms of the activation of the milk buying goal, which could as well contributed to the activation since it might be part of the same goal system. In the present study, by putting two different product categories "against" each other, with different goals and means associated, we demonstrated that the perceived applicability effect is due to an interaction between familiarity and habits, given the presence of not only familiar products (both for milk and orange juice) but also habitual products (milk brands frequently bought or considered in the past as an alternative, being part of the consideration set; Shocker *et al*., 1991).

To what concerns the interaction between perceived applicability and goal accessibility through supraliminal goal priming, results refuted our hypothesis of more consistency in the habitual product (milk) choice than in the non-habitual product choice, between the familiar and new context, when the habitual product buying goal was made accessible. Moreover, for

these participants the perceived applicability effect found in study 1 was replicated, with differences being found between contexts, with a significant proportion of participants choosing more the non-habitual product in the new context and the habitual product in the familiar context. Regarding the participants for whom an irrelevant goal was primed, this perceived applicability effect was also found and for some of them there was a marginally significant higher consistency for habitual products between contexts, than for non-habitual products. Thus, it seems that the habitual product goal accessibility manipulation not only didn't work in the direction of our prediction (consistency between contexts) but also increased the non-habitual products choice consistency, compared to the irrelevant goal accessibility in which the habitual product choice consistency was higher. There are some possible explanations for the reason why this happened.

The first logical reason is that this was a methodological failure given that the accessibility manipulation didn't involve goal priming at all. Another possibility is that it involved the priming of something else, namely a procedural priming instead (Förster *et al.*, 2009), i.e., the priming of the act (or sequence of acts) of buying the habitual product (going to the product section in the supermarket, searching for the product, etc.), given that the priming manipulation involved a mental simulation of that act. This was expected to facilitate carryover effects of goal activation on the subsequent choice. However, given the possibility that we primed the procedures instead of the goal, this wouldn't have an effect given that the decision task involved different choice procedures than the ones primed in the simulation task (e.g. the choice in the decision task is more constrained given the existence of fewer choices, compared to the simulated choice in the previous task). Also, the choice environment in the decision task (online shopping environment) is different from the simulated choice (supermarket environment) and so the carryover effects associated with procedural priming would be constrained. Thus not even this priming could have a significant effect over choice.

This wouldn't happen if a goal had been primed, with carryover effects being expected irrespectively of the type of choice context, as long as the existent means still allowed for the goal to be attained. This might explain why the effect associated with increased goal accessibility from the manipulation didn't occur but it doesn't explain why the consistency of non-habitual product choice was higher for the habitual goal accessibility condition, not being significantly different from the habitual choice consistency.

Another reason for this having had happened is the possibility of a contrast effect due to the priming events awareness (see Strack, Schwarz, Bless, Kubler & Wanke, 1993; Higgins, 1996). Given that the accessibility manipulation might have involved awareness of the goal priming, this can actually have made some participants aware of their own habitual behavior. They might have used this awareness to monitor their choices in the two contexts which could have had the effect of choosing in the opposite direction of their habits and pursuit of a different goal, i.e., of consciously suppressing the milk buying goal associated with their habits. In other words, given that the priming was supraliminal, people were aware that they were reporting their milk buying behavior and when confronted with a choice in a list with milk and orange juice products, they could still be aware of their own behaviors[19].

One possible result of the contrast effects is that they perceived the goal accessibility task as a bias to their choice, by directing it towards milk and thus actively tried to avoid the responses in this direction (Higgins, 1996). However, differences weren't found regarding this perceived task influence, between all the experimental conditions, as the results for the manipulation checks indicate. Moreover, they could have also seen the choice task as an opportunity to choose a new and different product from the habitual choices. Nevertheless, if this was the case, this would also happen for the irrelevant goal condition but it didn't.

[19] This might be due to the fact that the priming and choice tasks weren't presented as two different studies or two different parts of the same research. Thus, in the participant's viewpoint, this was all part of the same study.

Another explanation is that the goal priming might have elicited a monitoring process in which some of the strong habit participants assessed that the options available weren't appropriate to attain their milk buying habit (see Higgins, 1996). Thus, although the brands used were frequently bought brands obtained from a pre-test, there were only 6 options available. Given that the habitual goal accessibility task brought the milk buying situation to mind, these 6 options might have been perceived as not matching the desired alternative options. Consequently, due to this low judged usability, they might have given more conscious attention to the alternative option (i.e., to the mean to choose orange juice). Thus, if the information is judged as inappropriate (inapplicable to the decision context), it is likely that it will be suppressed and produce contrast effects of priming (Higgins, 1996). This would explain the results obtained given that "judged usability occurs after knowledge activation but before knowledge use" (Higgins, 1996; p.152), which would allow for this contrast effect to take place before deciding (and a higher control over the decision). Also, supporting the fact that this was elicited by the goal priming manipulation is that the same effect didn't happen in study 1 and the irrelevant goal condition replicated the results in that study.

Accordingly, literature on contrast effects considers that if a certain stimulus (category, trait, exemplar) is potentially relevant for a comparison, then when we compare that stimulus with the self (e.g. comparing a stereotypical person with ourselves), a contrast effect can follow (Dijksterhuis, Chartrand & Aarts, 2007). In the present study, if the task means were seen as relevant to attain the goal associated with habit which was supraliminally primed before exposure to the means, then they would have been compared to the ones cognitively associated with the primed goal (in the goal system). If a weak match between the habit and the available means in the decision task was perceived, then a contrast effect might have occurred. Moreover, this comparison process might have also increased the salience of the non-habitual products means, which could have attracted more attention given that they were

seen as different from the means associated with habitual choice (and also their presence would be unexpected). This salience would increase the probability of choosing the non-habitual products and thus, would bias choice towards its choice (following from a contextual salience effect; Higgins, 1996).

If in fact a goal was primed and contrast effects didn't occur, then an effect might have not occurred given an unconscious goal inhibition (Förster *et al.*, 2005; Förster *et al.*, 2009). Given that the task comprised a behavioral simulation, the task itself might have allowed both for goal activation and goal attainment within it. Thus by asking people to describe in written form what they would do if they had to buy milk and other products in the supermarket (goal activation), this same description could have allowed for goal attainment. This is because this goal might have been associated with the goal to do the task and therefore the goal would be "buy milk in this simulation", which would be attained upon "buying the milk" in their description (in the end of the task). Even if they didn't consciously associate the goal with the task goal, an unconscious effect might have occurred in which finishing the description in the task (by describing the final step, of buying the product in the supermarket) might have "artificially" allowed for goal attainment. This is turn allowed for the goal suppression, preventing it from being activated afterwards and from influencing the subsequent response in the decision making task (Förster *et al.*, 2005; Förster *et al.*, 2009). Consequently, the higher consistency of non-habitual product choice and lower consistency in the habitual product choice between contexts when the goal was primed, compared to the condition with an accessible irrelevant goal, could have been due to goal suppression in the simulation for the former. In this case, the goal would be suppressed in both contexts, even in a condition of high perceived applicability.

Following from this, we can see that either if there was a contrast effect or a goal inhibition process, in both cases the goal was suppressed, with the difference that in the

former explanation this suppression was conscious and in the latter was non-conscious. In either explanation, this can be inferred to have occurred only for the strong habit participants. Given the inhibition explanation, the strong habit participants are expected to have a mental representation of the habitual behavior which includes the milk buying goal and thus, if this goal is suppressed, the choice either in the new or in the familiar context won't be determined by habit given that its effect was inhibited. The same is not expected for the weak habit participants, given that this representation either doesn't exist or is unstable and thus there is no strong goal to be suppressed. If a contrast effect occurred, this would also be more probable for the strong habit participants given that they would be the ones to compare their habitual behavior with the means existent in the decision context, as explained before. For the weak habit participants this would be constrained by the fact that there would be no habitual behavior to make the comparison.

The results regarding the interaction between two sources of accessibility, goal priming and chronicity, support the claim that the constraining of the goal effect (either through suppression or contrast effects) would be expected for strong habit participants. Accordingly, results showed that it was only for the strong habit participants in the habitual goal accessibility condition that the consistency in the choice of habitual products between contexts was disrupted, having no significant differences compared to the consistency in the non-habitual product choice. This wasn't the case for the strong habit participants in the irrelevant goal accessibility condition, in which there was a higher consistency in the habitual product choice compared to the non-habitual choice consistency.

Although this finding supports both the inhibition and the contrast effects explanation, the same doesn't happen to what concerns the weak habit participants, which supports an inhibition but not a contrast effects explanation. Thus, although the results were non-

significant[20], there is a pattern indicating that in the habitual goal accessibility condition, the weak habit participants had a higher consistency in the choice of the habitual product, compared to the ones in the irrelevant goal condition. These latter participants, in turn, had a higher revision in accordance with the context, choosing more the habitual product in the familiar context and the non-habitual product in the new context. This pattern suggests that the habitual goal priming facilitated the choice in the new context (higher choice of the habitual product) compared to the irrelevant goal priming condition in which the choice of the habitual product was only facilitated in the familiar context.

With a contrast effects explanation we can only explain the goal suppression but not this facilitation for the weak habit participants. Differently, in a goal inhibition explanation both results are in accordance with it, given that the goal was suppressed for the strong habit participants while for the weak habit participants it increased goal accessibility given that prior to this, the accessibility was low or absent and the mental representation unstable (or even non-existent). Thus, one possibility is that for some of the weak habit participants the goal system was artificially strengthened in it (for the ones with an unstable mental representation) instead of being suppressed (which happened for the ones with a stable mental representation, i.e., a strong habit).

Nevertheless, only future studies can address this specific issue and specifically test this explanation. One way of doing it would be to add one more condition in the decision tasks with milk being replaced by another product with similar levels in the SRHI. Additionally, measures of goal activation and attainment could also be added (for example similar to the ones used by Förster *et al.* (2005) and Liberman *et al.* (2007)). By doing this we could control the mean priming from the milk buying means present in the context and thus measure the goal activation strength either associated only with chronic accessibility (irrelevant goal

[20] Attributed mainly to the sample's small n.

condition) or following from its interaction with the habitual goal priming. This wasn't done in the present study given that it would add more conditions to the ones presented and thus imply a greater complexity in the design.

Moreover, using the same goal priming procedure but with an interruption of the task (Liberman *et al.*, 2007) or instructions that would impede the final step in the choice to be described (the actual choice of the product) in the simulation task, would be a way of preventing goal attainment from occurring in the task. By doing this, we infer that the goal could be activated and suppression would be avoided. Finally, instead of this goal priming procedure, subliminal priming could also be used (see Aarts & Dijksterhuis, 2000) and also assess the effect of subliminally activating alternative means (orange juice buying means; using similar procedures to the one used by Shah and Kruglanski (2003)), in order to assess if this could have a similar effect of suppression, by in this case instead of inhibiting the goal, by facilitating an alternative goal through the priming the associated means.

Overall, these results support the argument that even though habits are considered to be a particular type of mental constructs (involving behavioral goals) they share some characteristics of other types of mental constructs (such as stereotypes and attitudes). Moreover, they show that habit adaptability to contextual changes, either in the features relevant to the decision or the "accidental" features, is sometimes underestimated being habit a dynamic mental representation that can compensate for these. In our view, this can be achieved through equifinality in the goal system mentally represented and/or means substitution, even if the means are not mentally represented in that goal system. This is however dependent on the maintenance of high accessibility through the contextual changes which in the present study was demonstrated for strong habit participants.

The same didn't happen for goal priming (expected to induce high accessibility through "artificial" means), which had the ironic effect of showing that habits are also prone to the

same type of suppression effects demonstrated for other types of goals not associated with habitual behavior (Förster *et al.*, 2005; Liberman *et al.*, 2007).

STUDY 3 – THE VISUAL PRIMING EFFECT

In study 3 we aim to demonstrate the accessibility effect through goal priming while avoiding the suppression effect associated with the methodology used in study 2. Therefore, in the present study the goal priming before the task doesn't involve a behavioral simulation like in study 2 and the priming awareness is reduced, although maintaining its supraliminal character. The context manipulation remains the same as in study 2, although here this was manipulated between-participants, in order to assess differences within each context (and not considering both at the same time, as in study 2).

Thus, differently from study 2, participants initially perform a visual (supraliminal) goal priming task, with a set of photographs either with irrelevant products or products related to the target goal. Following from this, we expect that participants will automatically judge the situation as a habitual product (milk) buying situation (i.e., automatically infer the goal from the images) and that this makes the buying goal associated more accessible, in the same way as the goal accessibility manipulation of study 2, but in a less explicit form. Thus, this visual (supraliminal) goal priming is expected to make the buying habit more accessible and "direct" the choosing of the means in the decision making task towards the means connected to the goal (i.e., showing a goal-directed behavior; Aarts & Custers, 2009), replicating the results found in study 2 for chronicity.

Unlike subliminal semantic priming, this type of supraliminal visual priming is not found in the literature regarding habits and therefore, we aim to explore if an effect can be obtained following from this. Accordingly, research on other types of mental constructs

shows that visual priming and goals can indeed work together in order for the mental construct to have its effect over behavior and/or decisions. One example concerns stereotypes and comes from Macrae, Bodenhausen, Milne, Thorn and Castelli (1997). According to these authors visual exposure to a stereotypical member of a group is not sufficient to trigger stereotype activation, being this effect moderated by the existence of a processing goal (i.e., the way the target is supposed to be analyzed or categorized). Following from this, participants had to evaluate photos (1000ms or 225ms, in study 1 and 2 respectively) that included female faces on the basis of three processing goals: 1) "feature detection" - white circle present or absent in the photo?; 2) "semantic judgment" - picture refers to an animate or inanimate object?; 3) "exposure" – participants only had to report the presence of the stimulus (picture). The evaluation of the picture was followed by a lexical decision task involving words associated with stereotypical (4) and non-stereotypical (4) female traits and non-words (8), in which they had to assess if the stimulus presented was a word or non-word. Results showed a faster judgment in the semantic judgment condition (either for an exposure of 1000ms or 225ms) compared to the other conditions and a faster judgment for stereotypical words than non-stereotypical words in the former condition. From this, they concluded that exposure to a member of a stereotypical group triggers the activation of the associated stereotype, when there is an activation of a goal of processing the target. In a similar way to this experiment, we expect participants to behave according to their habit given the existence of a buying goal. However, differently from this experiment, instead of providing participants with the goal (as we also did in study 2), we expect them to automatically infer it from the images, given the presence of specific visual contextual cues – fruit products in shelves.

Given this, in accordance with the predictions made in study 2 (see Figures 6 and 7), we expect no differences between the two contexts in the target goal condition, in terms of the habitual products chosen, given that the increased accessibility is expected to be sufficient for

the habitual products to be chosen for most participants in the new context. This is because, in spite of having a reduction in the perceived applicability they are compensated by an increase in accessibility from another different source – habitual goal priming. The difference is expected in the irrelevant goal condition, in which the participants in the familiar context are expected to choose significantly more habitual products, compared to the participants choosing in the new context.

The same effect is expected for accessibility from chronicity (see Figures 6 and 7) and thus, we also aimed to replicate this finding from study 2, not expecting differences for strong habit participants between the new and the familiar context, in terms of the habitual products chosen. Thus, although there is a reduction in the perceived applicability, their natural chronically high accessibility is expected to compensate for that and influence their decision towards choosing the habitual product (in spite of being an unknown brand). For the weak habit participants, the high context perceived applicability can compensate for the low chronic accessibility for most of the participants, with more habitual products chosen in the familiar than in the new context. This should happen for the ones with an unstable (weak) mental presentation but not if they have no mental representation at all, which is expected to be the case for only a small minority.

To assess the predictions regarding the "artificially" increased accessibility, participants were randomly assigned to four between-participants conditions, in an experimental design as follows: 2 (familiar context: high perceived applicability for milk buying habit vs. new context: low perceived applicability for milk buying habit) X 2(accessible milk buying goal vs. accessible irrelevant buying goal).

To assess the predictions regarding the "chronic" accessibility, participants were randomly assigned to two between-participants and two within-participants conditions respectively, in an experimental design as follows: 2 (familiar context: high perceived

applicability for milk buying habit vs. new context: low perceived applicability for milk buying habit) X 2(strong vs. weak habit participants).

METHOD

Participants. 160 students from the *University of Lisbon* - given credits for their participation, and other participants that volunteered to participate - were offered the possibility of entering a draw to receive 50 Euros in CDs and DVDs, for participating. To participate they had to fulfill the criteria of buying food products for domestic consumption at least once in two weeks. For this reason, the students that participated were requested to bring in their parents or friends that fulfilled these criteria, if they didn't.

The sample consisted mainly on young adults with the majority being students, with an overall mean age of 21.74 years old (*SD* = 6.56; *Min* = 18; *Max* = 51) and the majority having a high school degree (89.40%) or a university degree (6.90%). A questionnaire (see description below) portrays them as frequent shoppers, shopping for food on an average of five times per month (*M* = 5.26, *SD* = 2.48).

Procedure. Participants were asked to take part in two web-based studies, one on "Physical factors and consumption" and the other on "Real and virtual shopping environments". These were present as two different studies, with the first trying to assess the importance of the placement of products in shelves and their physical characteristics to the consumers, and the second aimed to assess the use of the internet for selling products by assessing the choices people make in online decision environments. Given that there was an explicit connection between the study tasks in terms of the subject (consumption and decision making) this was done in order to reduce the perceived connection between them and for not be seen as the priming and decision making tasks, respectively.

Goal priming task. After providing their informed consent, participants were requested to perform a task (see Appendix XII) and told that its aim was to assess the importance of physical factors and the placement of products in shelves, on the decisions people make in supermarkets, which represented the goal accessibility manipulation. They were randomly attributed to one of two goal accessibility tasks (between-participants tasks): irrelevant goal vs. target goal. This was derived from a mathematical formula in *Microsoft Excel* (generation of random numbers between 0 and 1) and sorting of participants list by column.

This task involved the presentation of images in individual slides (see Appendix XIII) through the use of the software "Slide Generator" (Tucker, 2006). For this, a link (and associated instructions) was provided in the webpage which allowed downloading a zip file containing the program, onto to the participants computer. In order to assure that all the images were seen and the program was run until the end, the participants were requested to write in the web page, the word that appeared to them in the last slide shown. After writing this word (which was saved on the server, allowing the confirmation of participation), they could continue with the experiment in the internet.

The target (milk) buying goal accessibility condition included the presentation of 4 target images (milk), 4 target related images (cereals; other types of dairy) and 4 general images (drinks; personal hygiene items; …)[21], each of them together with a neutral scale for assessment of the shelves in terms of its physical features (on a 7 point scale: light-dark and colorful-without color). The assessment scale was used in order to oblige participants to process the visual information and focus their attention on the images shown and at the same time to mask the real aim of the task, which was to make the fruit buying goal more accessible. Thus, we aimed to make the milk buying goal accessible following from the assessment of visual contextual cues – milk and milk related products in shelves.

[21] All conditions had images with a dimension of 300x225 pixels and the scales approximately 742x82 pixels.

The irrelevant buying goal accessibility condition involved the presentation of supermarket shelves images, with 8 target images (car products and other related materials) and 4 general images (gardening products) with the same scale as in the target goal condition. None of these conditions used words associated with the concepts of “buy”, “supermarket”, “milk” or others that could imply a semantic priming of concepts that could influence the activation of habit or of other mental representations which could influence decisions. Moreover, the brands of the products presented in the images weren’t visible or readable in order to control for brand effects.

After the accessibility manipulation task, participants performed a small web questionnaire both aimed to be a distraction task representing the end of the “first study” and at the same time to assess: 1) the 5 most frequently bought products (recall measure) by them (and not their family, friends or partners), with the first being the most bought and so forth; 2) the intention to buy a certain product from a list of 12 products in which milk and orange juice were included (with the other products being there just as a distraction measure). This question was formulated as “When do you intend to buy each of the following products?” and the answer comprised a 6 point scale (0 – Never; 1 – in less than 7 days; 2 – between 7 and 15 days; 3 – between 15 and 22 days; 4 – between 22 and 30 days; 5 – in more than 30 days); 3) the frequency of buying food products in the supermarket or other places (number of times per month); 4) socio-demographic measures (sex, age, school level, place of living).

Regarding the measure of the 5 products more often bought, the aim was not only to assess it but also to serve as a manipulation check, in order to assess if the target goal was activated. Thus, it was expected that if the priming of the milk buying goal was successful, this can have two consequences: a) the participants in the target goal condition report milk as the most frequently bought product more than the participants in the irrelevant goal condition; b) the participants in the target goal condition report milk more often in the top 5

products most frequently bought than the participants in the irrelevant goal condition. This measure was adapted to the case of goal activation. Since that the first measure was used in a study by Higgins, King & Mavin (1982), in which they predicted that chronicity associated with a trait related construct would be present if the construct was listed first in responding to one or more questions. The second measure was used in a second study by the same authors, using the frequency of responding with the construct to different questions, instead of construct primacy as in the previous measure. Given that explicit measures of goal activation are still scarce and only recently have started to be developed in a systematic way (Förster *et al.*, 2009), we decided to use this measure of construct activation and apply it here, given that our previous measures were based only on the effect at the output (decision) and not prior to it.

Context applicability manipulation. After the goal accessibility task and the distraction task, participants were requested to participate in a decision making task with the same type of WebPages and procedure used in study 2 (see Appendix XIV). The main difference was that the context perceived applicability manipulation was conducted between-subjects[22] and there were slightly different instructions from study 2. Thus, in the high perceived applicability task, people were asked to: "Imagine that you are at your house and have to prepare breakfast or lunch". Following this they were asked to choose the product they would most probably buy in that context. In the low perceived applicability task, people were asked to: "Imagine that you are at a friend's house in another country and have to prepare breakfast or lunch". Again, they were asked to choose the product they would most probably buy in

[22] Although the attribution of the participants to the two conditions was random, through a function inserted in the HTML page, at the end of the study there were more participants in the new context (n=90) than in the familiar context (n=70). However, this is not considered to be a problem given that results were analysed with non-parametric tests (Fisher's exact test) which take into account the different proportions.

that context and as in study 1 and 2, they were told that the products would be given to them after completion of the study.

Final questionnaire. Finally, participants responded to a short web questionnaire, with: 1) chosen product and chosen brand buying frequency (never, once, twice, three times, 4 or more times per month); 2) level of satisfaction with the choice made (5 point Likert type scale from not at all satisfied to extremely satisfied); 3) probability of choosing again in the future, the product chosen in the decision task (5 point Likert type scale from not at all probable to extremely probable); 4) feelings toward the choice made in the decision task (5 point Likert type scale from very bad to very good); 5) level of influence of a list of factors over the participants decision in the decision task (same as in study 1, with a 5-point Likert type scale from "no influence at all" to "strong influence"), including among other irrelevant factors, their habitual behavior and price of the products (the main factors we aimed to assess with this).

In the same way as we used explicit measures of goal activation (5 products bought more often) before the decision, we also created measures to demonstrate that the choice made in the decision task was a goal-directed choice. Thus, following from Förster *et al.* (2009) principles of goal activation, we used items 2, 3 and 4 of the questionnaire as different measures of satisfaction with the choice made. This aimed to demonstrate the principle that "goals involve emotion" and that goals accessibility moderate the level of emotion upon goal attainment (Higgins, Shah & Friedman, 1997). According to Förster *et al.* (2009), when goals are attained, people feel happy, relieved or satisfied (with the opposite happening if they are not achieved) and therefore, either participants with strong habits (chronics) or primed with the target goal, should have higher levels of satisfaction associated with these three measures, compared to participants with weak habits or primed with an irrelevant goal. These goal attainment items also allowed the creation of what we called the "post-choice goal

motivation scale", resulting from the aggregation of items 2, 3 and 4 of the questionnaire. Results regarding the validity measures for this scale, show a good level of reliability (α = .79) and high item-total correlations (with the lowest being .66).

Additionally to these measures, we also used the SRHI measure for milk and orange juice buying habits (Verplanken & Orbell, 2003) and a measure for the future intentions to buy milk and orange juice (Ajzen, 1991; 2002). Results regarding the validity measures for the SHRI measure, show a very good level of reliability for the milk habit measure (α = .93) and high item-total correlations (with the lowest being .52); and a very good level of reliability for the orange juice habit measure (α = .94) and high item-total correlations (with the lowest being .58). Results regarding the validity measures for the future intention to buy, show a very good level of reliability for the future intention to buy milk (α = .93) and high item-total correlations (with the lowest being .70); and a very good level of reliability for the future intention to buy orange juice (α = .96) and high item-total correlations (with the lowest being .82). Apart from characterizing the sample in terms of milk and orange juice buying habits, in the same way as for study 2, this SRHI measure also allowed the determination of two groups of participants – strong (high chronic accessibility) vs. weak milk buying habit (low chronic accessibility) - based on the lowest (Q = 2.67) and highest quartiles (Q = 4.75).

After completion of the questionnaire, participants were thanked for their participation and provided with an email contact in the case they wanted additional information and/or to receive the study results.

RESULTS

Questionnaire and Manipulation Checks. Regarding the baseline characteristics of the sample, there is an overall moderate habit strength to what concerns milk buying (M = 3.71, SD = 1.44), which the paired samples t-test shows as overwhelmingly significantly higher

that the orange juice habit strength (M = 2.36, SD = 1.35), $t(159) = 8.51$, p=.000. Regarding the future intention to buy the products, the paired samples t-test result was also overwhelmingly significant, with a higher intention to buy milk in the future (M = 6.26, SD = 1.37), than an intention to buy orange juice in the future (M = 4.50, SD = 2.02), $t(157) = 8.96$, p=.000. Additionally, there is a reported buying frequency for the product chosen of twice to three times a month (M = 3.33, SD = 1.34), a moderate perceived influence of habit over the participants decision (M = 3.38, SD = 1.32) and a low perceived influence of price over the participants decision (M = 2.87, SD = 1.30). Also, the sample is characterized by a high percentage of milk buying, with 55.1% of the participants reporting it in the top 5 products frequently bought (most frequently bought product: 16.90%; second most: 23.80%; third most: 5.60%; forth most: 4.40%; fifth most: 4.40%). Moreover, the participants report intending to buy milk on average between the week in which they participated in the task and the following week (M = 1.38, SD = 9.06)[23].

The manipulation checks regarding the goal activation showed that there are no differences in the percentage of milk choice within the top 5 products most frequently bought, between the target vs. irrelevant goal conditions. Also, there are no differences between the target vs. irrelevant goal conditions, regarding the percentage of milk chosen as the most frequently product bought, i.e., as the first in the top 5. Additionally, the independent samples t-test results show no significant differences between the two goal priming conditions in the SRHI for milk and orange juice, in the intentions to buy orange juice and milk in the future, in the reported buying frequency for the product chosen and level of influence of habit and price over the participants decision.

[23] This was measured in a scale in which 0 represented “never”, 1 represented “to buy in less than 7 days” and 2 represented “to buy between 7 and 15 days”.

Concerning the two chronic accessibility conditions (strong vs. weak habit), the independent samples *t*-test results show no significant differences between them in the SRHI and intentions to buy orange juice and in the level of influence of habit and price over the participants decision. Significant differences were found for the intentions to buy milk in the future (strong habit: $M = 6.89$, $SD = .31$; weak habit: $M = 5.19$, $SD = 1.99$), $t(80) = 5.37$, $p = .000$, $d = 1.2$, and in the reported buying frequency for the product chosen (strong habit: $M = 4.00$, $SD = 1.16$; weak habit: $M = 2.88$, $SD = 1.44$), $t(80) = 3.88$, $p = .000$, $d = .86$.

Regarding the two perceived applicability conditions (familiar and new context), the independent samples *t*-test results show no significant differences between them in the SHRI for milk and orange juice, in the reported buying frequency for the product chosen, in the intentions to buy orange juice and to buy milk in the future. Significant differences were found for the level of influence of habit (familiar context: M = 3.77, SD = 1.28; new context: M = 3.08, SD = 1.27), $t(158) = 3.41$, $p = .001$, $d = .54$, and price (familiar context: $M = 2.60$, $SD = 1.30$; new context: $M = 3.08$, $SD = 1.27$), $t(158) = 2.33$, $p = .021$, $d = .38$, over the participants decision.

To what concerns the goal attainment items and the goal motivation scale, results show no significant differences between the target vs. irrelevant goal conditions for the level of satisfaction with the choice made, probability of choosing again in the future the product chosen, in the feelings toward the choice made in the decision task and in the goal motivation scale.

In respect to the goal attainment items and the goal motivation scale for the strong and weak habit participants, results show no significant differences in the level of satisfaction with the choice made and in the probability of choosing again in the future the product chosen. A marginally significant difference was found in the feelings toward the choice made

in the decision task (strong habit: M = 3.90, SD = .77; weak habit: M = 3.60, SD = .70), t(81) = 1.90, p = .060, d = .41.

With regard to the differences between the participants deciding in the familiar context and the participants which did that for the new context, the goal attainment items and the goal motivation scale show significant differences for the level of satisfaction with the choice made (familiar context: M = 4.10, SD = .88; new context: M = 3.54, SD = .84), t(157) = 4.07, p=.000, d = .66, probability of choosing again in the future the product chosen (familiar context: M = 3.66, SD = 1.10; new context: M = 2.74, SD = 1.13), t(158) = 5.13, p=.000, d = .83 and in the feelings toward the choice made in the decision task (familiar context: M = 3.90, SD = .78; new context: M = 3.49, SD = .74), t(158) = 3.40, p = .001, d = .54.

For the goal motivation scale, ANOVA results show a main effect for applicability with a higher result obtained for the participants choosing in the familiar context (M = 3.88, SD = .82), compared to the participants choosing in the new context (M = 3.26, SD = .72), F(1, 79) = 11.09, p = .001, d = .81; and an interaction effect between applicability and chronicity F(1, 79) = 6.26, p = .014, with post-hoc analysis showing a higher result for the strong habit participants that decided in the familiar context (M = 4.21, SD = .69) compared to the strong habit participants that decided in the new context (M = 3.26, SD = .77), p = .000, d = 1.34, and a higher result for the strong habit participants that decided in the familiar context (M = 4.21, SD = .69) compared to the weak habit participants that decided in the same context (M = 3.55, SD = .82), p = .007, d = .89; with no significant results for the other interactions. No significant main effect was found for chronicity.

Finally, the comparison of the SRHI results for the milk buying habit from study 2 (M = 4.26, SD = 1.43) and the present study (M = 3.71, SD = 1.44), shows that the latter is significantly lower than the former t(318) = 3.41, p = .001, d = .38. No significant differences are found for the orange juice habit.

Decision Making Task. Binomial test results for the choice in the familiar context show no significant differences between the proportion of the habitual product chosen (.56) and an expected proportion that would have been obtained by chance[24] (.50). For the new context, there is an almost marginally significantly higher proportion of the non-habitual product chosen (.61), than an expected proportion that would have been obtained by chance (.50) (p = .045; Binomial).

To what concerns the differences in the habitual product choice between the familiar and new context (see Table 18), Fisher's Exact test results show that there is a higher proportion of habitual products chosen in the familiar context (.58) compared to the new context (.39) (p = .025; Fisher's exact test).

Table 18 - Differences between the familiar and new context choice frequencies with Fisher's Exact test

	Habitual	Non-habitual	Habitual product proportion.	One-tailed (right)
Familiar context	39	31	.58	p = .025
New context	35	55	.39	

Fisher's Exact test results regarding the differences between contexts in the choice of habitual products for the target goal (see Table 19), show a marginally significant difference with a higher proportion of habitual products chosen in the familiar context than in the new context. For the irrelevant goal condition the result is identical to the previous condition although being non-significant. This difference in significance in spite of the almost equal proportions can be attributed to the small n.

[24] With this representing the actual proportion existent in the choice list for the first decision.

Table 19 - Differences in frequencies between the two goal priming conditions with Fisher's Exact test, for each type of context

	Habitual	Non-habitual	Habitual product proportion.	One-tailed (right)
Target goal (Fam)	23	18	.56	p = .086
Target goal (New)	18	28	.39	
Irrelevant goal (Fam)	16	13	.55	p = .125
Irrelevant goal (New)	17	27	.39	

Finally, Fisher's Exact test results regarding the differences between contexts in the choice of habitual products for the weak habit participants (see Table 20), show that there are no significant differences. Regarding the strong habit participants, there is a significantly higher proportion of habitual products chosen in the familiar context (.77) compared to the new context (.33) (p = .004; Fisher's exact test).

Table 20 - Differences in frequencies between the strong and weak habit participants with Fisher's Exact test, for each type of context

	Habitual	Non-habitual	Habitual product proportion.	One-tailed (right)
Strong habit (Fam)	17	5	.77	p = .048
Strong habit (New)	9	10	.47	
Weak habit (Fam)	7	14	.33	p = .500
Weak habit (New)	6	15	.27	

DISCUSSION

Regarding the perceived applicability effect, we expected a replication of the results obtained in the previous studies, which was refuted. Accordingly, participants in the familiar context chose in a way close to chance and the participants in the new context chose more organics than chance, although this being almost marginally significant. In spite of this, results still show that more habitual products were chosen in the familiar than in the new context, independently of the accessibility manipulations.

Moreover, the measures of goal motivation as evidence of a goal-directed choice (Förster *et al.*, 2009) show differences between the participants that chose in the familiar and those who did it in the new context. Participants who made decisions in the familiar context were significantly more satisfied with the choice made, had a higher perceived probability of choosing the same product again in the future, felt better with their choice and had an overall higher goal motivation, compared to the participants who decided in the new context. Given that we acknowledge that the goal activation happened in both contexts due to the prime of goals through means, these results indicate that its attainment was more facilitated in the familiar than in the new context. This is in accordance with Higgins *et al.* (1997) who consider that goal accessibility moderates the level of emotion upon goal attainment (higher accessibility implies a higher level of emotion when the goal is attained). Thus, given that the participants felt better and were more satisfied with their choice (goal attainment) in the familiar context, according to these authors, this might be evidence that the habitual goal was more accessible in that context. Although this type of measures are still being developed (Förster *et al.*, 2009) and need further assessment in terms of their validity in future studies, nevertheless they seem to support the argument we made before since the results demonstrate a motivational effect rather than a cognitive effect based only on brand or product priming.

To what concerns the hypothesis regarding the visual goal priming effect, which aimed to test the same hypothesis advanced in study 2 but in this case with a different methodology, the results show it is refuted. Differently from study 2, we tried to use a methodology which could overcome the critics regarding the possibility of involving procedural priming instead of goal priming or a procedure that allowed for goal suppression. At the same time, the methodology used in the present study aimed to reduce the priming awareness and consequently the possibility that for some of the people, contrast effects emerged. This was not accomplished and there is no evidence of goal activation, which in our view wasn't due to contrast effects or goal suppression but rather to a methodological failure in doing this, as evidenced by some results regarding the manipulation checks.

First, the checks of goal activation based on recall measures show that there are no differences between the goal priming conditions regarding the recall of milk as the most bought product or the most often recollected product in the top 5 of products frequently bought and thus, there is no evidence that the mental construct was activated (Higgins *et al.*, 1982). Second, the expectance of no differences in the products chosen in the familiar and new contexts, for the irrelevant buying goal priming and of more habitual products chosen in the familiar context for the milk goal priming, is refuted and there is no evidence of a goal priming effect but only of a perceived applicability effect. Moreover, this also shows that the failure was due to the methodology and not to a suppression effect given that in study 2 differences were still found between the two conditions, although not in the expected direction. Third, differences between these conditions regarding the measures of goal attainment and the goal motivation scale, as evidence of a goal-directed choice (Förster *et al.*, 2009) aren't found.

To our knowledge, this visual priming effect wasn't yet explicitly demonstrated in the habit research literature. Consequently, a methodology that demonstrates the supraliminal

(visual) goal priming effect remains in need of being developed. On one side, this methodology could involve a subliminal visual priming of the products through images, in the same way that in Consumer Psychology is done for brand priming (Coates, Butler & Berry, 2006), and thus evaluate if these images haven an influence over choices, in the same was as logos or symbols associated with certain products (e.g. Tang, Fryxell & Chow, 2004). On another side, it could involve the supraliminal presentation of the actual products instead of the product shelves or even a manipulation of the physical characteristics of the shelves (background, position of the products, etc.), in order to make the products or associated cues more visually salient (following the same idea used by Mandel & Johson (2002) for web environments) – implying an "incidental" context manipulation. In every case, this methodology should involve a pre-test to assess if the manipulation has an effect, which lacked in our study (for the visual priming manipulation).

Regarding the interaction between the perceived applicability effect and chronicity, we expected a replication of the results obtained in study 2. Results show that this hypothesis is refuted. This happens because strong habit participants chose more habitual products in the familiar context than the strong habit participants in the new context. Also, there are no differences between contexts to what concerns the weak habit participants. In our view, this can be explained by the fact that in this study, habit was significantly weaker than in study 2, which prevented the results from being replicated. This is consistent with the results given that, for the weak habit participants the mental representation would have been too unstable or even non-existent for the context perceived applicability to have an influence over their decisions. At the same time, given that for the strong habit participants the mental representation wouldn't be so strong then they would be closer to the weak habit participants from study 2 than to the strong habit participants. Accordingly, the results for the strong habit participants in the present study replicated the results for the weak habit participants in study

2. In other words, given the weaker mental representation of the strong habit participants in the present study, it wasn't enough to maintain choice consistency between contexts and allow for a higher choice of habitual products in the new context, compared to the weak habit participants.

Nevertheless, there is still evidence that the goal was activated for the strong habit participants but not for the weak habit participants, given that they felt slightly better about their choice compared to the latter, which might indicate goal accessibility was higher for the former (Higgins *et al.*, 1997). At the same time this might also be evidence that this mental representation was not strong enough given that there are no differences in the satisfaction with the choice or the probability of choosing the product again in the future.

However, it should be noted that this concerns the overall results for the strong and weak habit participant's main effects. If we consider the interaction between applicability and chronicity, a clear picture appears. In fact, the goal motivation scale results showed a higher post-choice goal motivation for the strong habit participants deciding in the familiar context, compared to the ones deciding in the new context, with the same not happening for the weak habit participants. Therefore, we infer that strong habit participants were "aided" by the activation resulting from the higher perceived applicability in the familiar context and were the ones with higher goal activation level. This is because they were the ones with the higher post-choice goal motivation, which might also indicate that more than a cognitive effect we are in the presence of a motivation effect resulting from goal activation and attainment (Förster *et al.*, 2009), given that differences in the choices were also associated with differences in the goal motivation dimensions.

Overall, in accordance with study 2 there might be evidence that when mental representations are not strong (no naturally high chronic accessibility or accessibility due to goal priming), people are more influenced by context and thus, are more susceptible for their

habit to be disrupted, than people with strong habits. Thus, it seems that the prediction that the decision processes change with context changes (Verplanken *et al.*, 2008) and that habit is disrupted in new and unfamiliar contexts (Neal *et al.*, 2006; Ouellette & Wood, 1998; Wood & Neal, 2007; Wood *et al.*, 2005) seems to hold. However, this seems to be the case only when habits are not strong enough (high activation potential) to resist context changes and thus for habit transference to occur between contexts.

GENERAL DISCUSSION

Our main argument across the three studies, was that even though habits are a particular type of mental constructs involving goal activation (Aarts & Dijksterhuis, 2000; Wood & Neal, 2007), they share some characteristics with other types of mental constructs such as stereotypes for example (Aarts & Dijksterhuis, 2000), with one of them being their dynamism (see Garcia-Marques *et al.*, 2006). Consequently, we argue against classical views of habit in which the situation's influence over behavior is direct (as simple S-R responses; see Aarts & Custers, 2009) by considering that the situations effect over behavior is mediated by psychological factors. Moreover, we argue against the idea that the repetition of the same behaviors in the same contexts should elicit the habitual behavior over and over. Accordingly, if the context changes and becomes new, unfamiliar and/or unstable, habit should be disrupted as predicted by the *habit discontinuity hypothesis* (see Verplanken *et al.*, 2008). Differently, we consider that even if the context changes, the habitual behavior can still occur, as long as some conditions are maintained – which we can call the *habit transference hypothesis*.

To demonstrate this, we based our predictions on results from Social Psychology in general and Social Cognition in particular, in terms of the mental constructs activation rules (Higgins, 1989; 1996; Higgins & Brendl, 1995) and Goal Systems Theory (Kruglanski *et al.*,

2002), which we considered a basis for showing habits dynamic properties. In this line of research, mental constructs activation is predicted to occur given the presence of two psychological factors: 1) cognitive accessibility of the construct, i.e., high readiness to be used at output (i.e., behavior; Higgins & Brendl, 1995); 2) applicability of the construct to the context, i.e., the greater the overlap between the features of a knowledge structure and the features of a stimulus or the context that is presented to us, the greater that construct's perceived applicability to that stimulus or context (Higgins & Brendl, 1995).

Although evidence of accessibility effects regarding habits has been shown (Aarts & Dijksterhuis, 2000) the same cannot be said about evidence of applicability effects in an automatic and unconscious way (see Higgins, 1996). The few examples that exist concern a more conscious judgment which can be considered *perceived applicability* or judged usability effects - perceived relevance and appropriateness of the stored knowledge for use in a given context (Higgins, 1989; 1996). Nevertheless, neither the goal-dependent or goal-independent views acknowledges explicitly the role of mental constructs applicability although it can be inferred from the results of Wood *et al.* (2005), as a demonstration of perceived applicability.

This perceived applicability effect was demonstrated in our first study, which showed that it was not the mere presence of perceived situational "barriers" to the choice of organic food like price and availability of the products (which were maintained constant in the choice tasks) that determined the habitual behavior of buying non-organic milk. What determined behavior were psychological processes, with differences in results being explained by familiarity. This familiarity implied that the means in the choice context would be recognized and perceived as frequently pursued means (product brands) to attain the goal to buy a certain product. Given this, there is a high probability of at least one or more product having been bought in the past (and thus be part of the choice set) or at least having been considered for choice (being part of the consideration set; Shocker *et al.*, 1991) and thus be mentally

represented, i.e., there is a high probability of a partial or complete overlap between the means present in the choice context and the means existent in the goal system associated with the habit mental representation. Consequently, perception is expected to determine the application of this cognitive information to the decision situation. Accordingly, in the familiar context there is a higher perceived applicability - higher perceived match between the mentally represented goal and linked means and the means existent in the choice context - which increases the probability that the milk buying goal is attained by choosing the non-organic means. Accordingly, study 1 results showed that means associated with habit (non-organic milk) were more chosen in the familiar than in the new context. Study 2 and 3 also supported this effect, showing that the habitual product (instead of a non-habitual product) was chosen more in a familiar context than in a new context, regardless of other experimental manipulations.

In our view, this is explained by the fact that the buying goal increased accessibility from the means present in the choice context benefited from a perceived applicability effect in a familiar context, in which the mean-goal cognitive association is inferred to be stronger for the non-organic means (study 1) or habitual means (study 2 and 3), given a past co-occurrence in similar choice situations. This effect occurred even when other alternative and competing means were presented (non-organic milk buying means in study 1 and orange juice buying means in study 2 and 3). This effect wasn't strong in a new and unfamiliar context given that the means presented didn't frequently co-occur in the past with the milk buying goal activation and thus, the context's applicability is perceived as lower. Although not being explicitly acknowledged in the Goal Systems Theory (Kruglanski *et al.*, 2002) these effects can easily be included in it, by adding a concept not explicitly identified or studied in behavioral goals and habit research – decision context familiarity.

Although these results showed that the context's influence over behavior is not direct but mediated by psychological processes by means of a perceived applicability effect, they are not enough to demonstrate habits dynamic properties. For this, the accessibility of the mental representation of habit must also be shown as an important determinant of habitual behavior and moreover the effect of its interaction with context perceived applicability. Accordingly, a demonstration that is still lacking on habits research regards the interaction between accessibility and applicability (either actual or perceived applicability), which we also aimed to show. Thus, in our view habit is a dynamic mental representation that has been underestimated given that under certain conditions it can compensate for contextual changes.

These contextual changes, as we define them, refer to changes in the "essential" features of the context – relevant to the decision, being in our studies considered as the means to attain the goals – and not changes in the "incidental" features (e.g.: physical characteristics of the online shopping environment and of a supermarket environment; presence or absence of people that usually accompany us for shopping; etc.). In this regard, the definition of what can be considered context changes is very important for behavioral change interventions on one side and for research on habits on the other side. This is because misconceptions concerning what is a context change have led to habits being portrayed as rigid mental representations, which results from the fact that habit can be seen as associated with certain context features when in fact can be associated to others. For example, changes in price and availability of organic products can be seen as a way to change non-organic buying habits, when in fact they can be associated with other contextual features such as the presence of means to attain the goal associated with the habit. In our studies, we considered that habit could be maintained given that these means to attain the goal could still be used even if they were unfamiliar, This resulted from equifinality in the goal system mentally represented and/or means substitution (Kruglanski *et al.*, 2002) which allowed the strong habit

participants in study 2 for example, to "resist" the changes in the "essential" contextual features. In other words, this can occur as long as the chronic accessibility or accessibility due to priming is high enough to maintain itself through the context changes, which was demonstrated in study 2. In this study, participants characterized as having strong habits (high chronic accessibility) maintained consistency in the habitual product (milk) choice, even when there was low context perceived applicability, .i.e., when the context became new and unfamiliar. Although we analyzed perceived applicability and not actual applicability of the mental construct, still we think this is in accordance with one of the mental constructs activation rules: "*strong accessibility can compensate for weak applicability*" (Higgins & Brendl, 1995), which to our knowledge had not been demonstrated in habit research.

Moreover, the dynamic properties of habit were also demonstrated in study 1, in which consistency in the choice of non-organic products (habitual products) was found within-participants choices. In this study, most of the participants maintained their choice over three decisions, even though there were changes in the decision context (decrease in perceived applicability) which constrained more that choice from one decision to the next, given that the same product chosen before couldn't be chosen again. This consistency between choices made by the same participants happened mainly for choices in the familiar context, which is consistent with a dynamic view of habit, given that the contribution both from accessibility and perceived applicability was enough to maintain the choice over the decisions. This is not in disagreement with the results found in the self-regulation literature in which it would be expected that goal activation would be suppressed after deciding in the first choice (Förster *et al.*, 2005; Förster *et al.*, 2009). Although in our view this might have happened for a small number of the participants which revised their choice in the familiar context (only between the first and second decisions), for most of them goal activation might have been maintained. Therefore, in our view suppression might happen when there is no alternative available mean

that allows for goal-attainment. Consequently, our prediction was that the goal activation can maintain itself overtime given that other means are still available to achieve the same goal (equifinality in goal systems; Kruglanski *et al.*, 2002). Nevertheless, it is interesting to see that even in the new context there was some consistency in the non-organic choice between decisions. This goes against the habit discontinuity hypothesis, given that in spite of the context changes - i.e., habit becoming less applicable, given that if it was chosen in the previous choice fewer options were available in the second, to choose according with it – consistency in the habit was still achieved by some participants. Thus, the "window" of opportunity to deliberate, as predicted by the habit discontinuity hypothesis (Verplanken & Wood, 2006; Verplanken *et al.*, 2008), was actually "closed" by the participants.

As we said before, this habit effect is dependent on a high accessibility of the habit mental representation (involving a mental representation of the goal system). Thus, even if the habitual mean (e.g. the habitual brand) is not present, the fact that the habitual product is still present in the new context might be sufficient to choose it, as long as there is a high accessibility of the associated goal. This could explain why the choice is still biased towards choosing the habitual product in the new context given that, since perceived applicability is low, the most logical reason for the bias is that it comes from the high accessibility. In support of this, results from study 2 and 3 showed that when there is no naturally high chronic accessibility (i.e., when there is a weak habit), people are more influenced by context and thus, more susceptible for their habit to be disrupted, i.e., they choose consistently with their habit in the familiar context but this consistency ceases to exist when they have to choose in the new context. Thus, when habits are not strong enough (low accessibility) they cannot resist context changes and habit transference between contexts doesn't occur, as shown in study 3 for the (not so) strong habit participants. Under this condition, the prediction that the decision processes change when context changes (Verplanken *et al.*,

2008), which causes habit to be disrupted when this context becomes new and unfamiliar (Neal *et al.*, 2006; Ouellette & Wood, 1998; Wood & Neal, 2007; Wood *et al.*, 2005) seems to hold.

To what concerns the effect of goal accessibility from priming, we failed to demonstrate it and to support the prediction that "*strong accessibility can compensate for weak applicability*" (Higgins & Brendl, 1995). In our view, this had to do with a goal inhibition effect which suppressed its activation. Accordingly, study 2 showed that by making people simulate their behavior might allow for both goal activation and goal attainment. This has a different effect when there is a strong vs. weak habit. Results seem to indicate a pattern in which goal suppression happens for the former and goal facilitation happens for the latter (for which an unstable or weak goal system is inferred to have become stronger following from goal priming). In spite of our research not being sufficient to explicitly demonstrate what the cause of this effect was and further research is needed to address this specific issue, it still demonstrates an effect that to our knowledge hasn't been found in habit research and therefore should be more studied in the future. Specifically it showed that habits are also prone to the same type of suppression effects demonstrated for other types of goals not associated with habitual behavior (Liberman *et al.*, 2007; Förster *et al.*, 2005). Since goals are an important component of self-regulation and monitoring processes, it should not be surprising that suppression effects can also happen in the case of goals associated with habits, given that to attain a goal sometimes we need to suppress other alternative and competing goals or means (Kruglanski *et al.*, 2002). As far as we know, this suppression effect due to goal priming wasn't yet demonstrated on habit research in particular and is therefore necessary to develop additional studies to understand the processes involved.

Overall, these studies raise some important questions regarding the pre-conditions that allow for habit to influence behavior, and specifically showed context's perceived

applicability (concerning familiarity) and habit accessibility as important factors in this sense. However, studies assessing "automatic" applicability without the perceived component (subjective utility) should also be performed, given that this effect remains to be demonstrated in habit research. Another aspect that should be taken into consideration is that our studies involved short term responses. Thus, although study 1 analyzed habit transference over three responses within the same context, this is not enough to demonstrate the long-term effects of habits regarding the interaction between context perceived applicability and accessibility. This could be accomplished through a longitudinal methodology in which the habits effect and the influence of context conditions (e.g. context stability) and accessibility could all be assessed within-participants overtime.

Moreover, regarding the measures used in our studies, it should be noted that all of our measures of goal activation and habitual behavior were explicit. This can be argued as a failure in demonstrating automatic processes given that only implicit measures could tap into these processes associated with habit and goal activation, for example through a measure of response speed in the familiar vs. the new context. However, in our view this is not a problem given that we still showed either through the results or some of the manipulation checks that a motivational effect from goal activation was indeed involved and not semantic or procedural priming (Förster *et al.*, 2009). Also, the SRHI measure of habit strength used to create the weak and strong habit groups has proven to possess discriminant validity regarding other implicit measures of habit (Verplanken & Orbell, 2003). Nevertheless, future studies should include this type of measures and also test the effect of subliminal goal priming in producing the same type of results found here. The expectance is that an increase in goal accessibility from subliminal priming will produce the same results as the chronicity effect (see e.g. Higgins, 1996), regarding the consistency within habitual product choice and consistency between contexts.

Finally, despite of our view of habits being closer to the goal-dependent perspective (Aarts & Dijksterhuis, 2000), we didn't aim to support this over the goal-independent view with our studies (Wood & Neal, 2007), i.e., to demonstrate if goals have a mediating or moderating role. What we aimed to demonstrate was that goals are important to respond to the question: Do habits involve a rigid mental representation dependent only on the context or do they involve a flexible and dynamic mental representation resulting from an interaction between the context and behavioral goals? We think our studies represent a contribution to answer this question given that our results are best explained by means of a motivational effect based on the existence of mentally represented goal systems and their structural and functional properties (Kruglanski *et al.*, 2002). Thus even if goals don't mediated the decisions of participants in our studies and given that we didn't demonstrate this mediating role, still we showed that they are important "aids" for habits dynamism. This dynamism was demonstrated by1) habit transference between contexts (from a familiar to an unfamiliar context), which we inferred to be associated with a means substitution process and 2) habit transference between decisions (with habitual choice being consistent over three decisions, in spite of a reduction in perceived applicability), which we inferred to be associated with a equifinality in the goal system mentally represented. Moreover, differences in decisions matched differences in goal motivation and habit strength, and are not consistent with an explanation in terms of a semantic effect (due to the priming of the word "milk") or a cognitive effect (brand). Accordingly, if we were in presence of a semantic effect, then we shouldn't expect differences between contexts, given that the word milk was equally present in both and also all participants were equally primed with the word milk (before the decision making tasks, when the product category appeared; see method section). Also, if we were in presence of a cognitive effect, we shouldn't expect decisions in accordance with habit in the new context (with unfamiliar brands). However, we demonstrated that habit was still

followed in the new context for strong habit participants, which shows that if people are motivated towards attaining a certain goal, this goal will be attained even if the habitual brand is not present our was already chosen in a previous choice.

All these processes are not explicitly included in theoretical principles (namely in the Goals Systems Theory; Kruglanski *et al.*, 2002) but they actually match the processes that occur in real life. In everyday decisions, people frequently encounter changes in the decisional contexts, such as for example: 1) being confronted with the absence of their habitual product in the supermarket or local store shelf (or even in the online shopping webpage); 2) having to relocate to a geographical and culturally different context in which the habitual options are no longer present or are different (e.g. moving to another country or city); 3) changes in the choice context characteristics associated with the habitual product, such as an increase in the social pressure towards the choice of alternative products (e.g. the organic alternative) or other changes. Despite of these changes, we view consumers and decision makers in general (e.g. in the recycling behavior domain) as adaptive decision makers (Palma-Oliveira, 1995; Payne, Bettman & Johnson, 1993) who can surpass certain contextual changes. This is in opposition with the view in which they are "machines" that stop working if their "habitual fuel" is spent and cannot use any fuel other than this, without causing problems to the machine.

Other studies should be done regarding the demonstration of habits dynamic properties and the identification of other important preconditions of its activation, which can work either as a barriers or facilitators to a conscious and intentional mediation to behave in an environmentally friendly way. Still, we think our work has implications for various areas of human behavior research and specifically to Environmental and Consumer Psychology, since we showed that habit can be influenced by the choice context, working either as an

unconscious barrier [25] by almost completely inhibiting the choice of organic products - study 1 - or as an unconscious constraint on the choice of a non-habitual product - study 2 and 3 (which for example can have implications for projects aimed at promoting the installation of new energy efficient devices or to the promotion of new types of products, such as fair trade, ecological or recyclable).

In order to change a "frozen" habit individuals need to invest in a long-term self-regulatory effort to resist the temptation of falling prey to it. Our results indicate that habit has been underestimated given that it is a dynamic mental representation that when strong, can adapt to certain contextual changes. Interventions aimed at disrupting habits should take this into consideration and develop self-regulatory competency (Fraijo-Sing, Corral-Verdugo, Tapia-Fonllem & González-Lomelí, in press) in order for these to be successful. Results from study 2 seem to indicate that by making people aware of their habits we can constrain their negative effect by suppressing goal activation. This is a new finding not found in the literature regarding habitual behavior change and still needs further study regarding the conditions in which this can take place. Nevertheless, we think this is a starting point for increasing the success of intentional proenvironmental behaviors development and to "vaccinate" people to resist the temptations of which influence they are not aware.

[25] For definitions and differences between the concepts of unconscious barriers and constraints, see chapter 1.

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Chapter 3

HABITS VS. IMPLEMENTATION INTENTIONS: INHIBITIVE AND FACILITATIVE CONDITIONS

Even when an individual has the intention to behave in a proenvironmental way, there can be various barriers and constraints to the implementation of this intention into action. These barriers and constraints can have their effect mediated by perception or with reduced awareness and consciousness. Their presence can prevent the operation of a goal intention[26] (e.g. "I intend to buy organic food") or performance of goal directed behavior from occurring. This can take place because these barriers and constraints can interfere/inhibit a proenvironmental goal and/or increase the activation strength of an anti-environmental behavioral goal (e.g. "Buy non-organic food") (see chapter 1 and 2).

This could be avoided if we designed strategies for shielding individuals from the influence of anti-environmental goals ("temptations" and "bad habits"), i.e., activating focal goals to which the individual is committed and has the intention to pursue (development of "good habits"), in order to inhibit the accessibility of alternative goals (Shah, Friedman & Kruglanski, 2002). These strategies are still lacking in the literature regarding environmental behavior (for exceptions, see Bamberg, 2000; 2002a; 2002b; Holland, Aarts & Langendam, 2006) with most examples being taken from research in Social Psychology in the last few decades. One of the strategies that can be used with this aim is the development of implementation intentions (Gollwitzer, 1999).

Some authors argue that the predictive value of a goal intention and its effective translation into action depends on the formation of a subsequent implementation intention, which is causally closer to the decision to perform a behavior (Bamberg, 2002; Rise, Thompson & Verplanken, 2003). In this sense, implementation intentions have more predictive value than general goal-intentions as they specify what is needed to perform the

[26] I.e. the intention to achieve a goal, with goal being defined as an internal representation of a desired state, such as a behaviour or outcome (Aarts & Custers, 2009).

behavior, which means that stronger implementation intentions will increase the probability of performing the behavior (Bamberg, 2002; Gollwitzer, 1999; Sheeran, Webb & Gollwitzer, 2005).

Implementation intentions follow from goal-intentions and involve a planning process specifying that "when situation Y arises, I will perform response X" (e.g. "when I am in the dairy section, I will buy organic milk"), linking a critical situation (situation Y) with a goal directed behavior (response X) (Schweiger Gallo & Gollwitzer, 2007). This planning includes the "when", "where" and "how" the responses will allow the attainment of the goal, i.e., behaving or deciding in accordance with the goal (Shah & Kruglanski, 2003). The formation of implementation intentions with this type of planning implies that the expectation of encountering situation Y in the future makes the mental representation of it more cognitively accessible (due to an increase in its activation strength). This heightened accessibility in turn, facilitates the selective attention involved in the detection of the presence of situation Y in the surrounding environment and thus the individual readily responds to it (response X) whenever it is detected (Aarts, Dijksterhuis & Midden, 1999; Gollwitzer, Bayer & McCulloch, 2005).

The power of implementation intentions comes from the fact that they can artificially and temporarily simulate the automaticity characteristic of habitual behaviors (Aarts & Dijksterhuis, 2000). Thus, under certain conditions, the frequent implementation of an intention in a given situation creates a goal-action link, which can be activated in the presence of the relevant environmental cues. This process underlies the formation of "natural" habits, which some authors consider goal-directed automatic behaviors that are mentally represented (as knowledge structures; Higgins 1989) and can be triggered by environmental cues (Aarts, Verplanken & van Knippenberg 1998; Verplanken, Aarts & van Knippenberg 1997). Hence, a habit exists when the activation of a certain goal (e.g. buy non-organic milk) from the

relevant situational cues (e.g. products in the supermarket shelves), automatically elicits the cognitively associated action (e.g. choose the habitual non-organic milk brand). Following from this, either "natural" habits or implementation intentions can be seen as a form of goal-dependent automaticity, as this type of automaticity requires an initial past or present intention or act of will for a goal to be activated (Bargh & Chartrand, 1999). Thus, before automaticity is achieved, an effective goal-directed behavior to attain our goal intention should be chosen and linked to a selected critical situation (Gollwitzer *et al.*, 2005), therefore creating the goal-action link. The difference is that while for habits this occurs naturally, for implementation intentions this is achieved "artificially" (thus, promoting "artificial" habits).

The way in which implementation intentions can acquire automaticity characteristics involved in habits activation and operation is demonstrated in the dual process model of behavioral goal activation (Bargh & Chartrand, 1999). According to it, the cognitive and motivational processes that take place prior to goal operation and the way in which the behavioral goal is activated can vary depending on two preconditions: 1) Triggered by a conscious and intentional mediation or an act of will (e.g., as in the case of athletic skills), which corresponds to an intended goal-dependent automaticity; 2) Triggered automatically by environmental features, unintentionally and without awareness (e.g. stopping the car when the red sign appears without a conscious decision to do it), which corresponds to an unintended goal-dependent automaticity.

Given this, with a frequent implementation of the same intentions and decisions in the same contexts (i.e., the more familiar and stable they are), the operation of the goal becomes automatic, as represented by the first type of activation. However, a reduction of consciousness can take place, which means that control is passed from the individual onto the environment (conferring a higher relative weight to the environment's influence), as represented by the second type of activation (Gollwitzer, 1999). In other words, the first type

of activation can lead to the second, depending on the frequency and consistency of the activation and operation of the same goals in the same contexts (Bargh & Chartrand, 1999).

Summarizing, due to similarity in terms of the processes involved, it is argued that implementation intentions and habits are similar constructs in terms of structure and activation from context (Aarts & Dijksterhuis, 2000), the difference being that the former are temporary ("artificially" created) and the latter are "chronic" (created naturally overtime). Accordingly, research by Aarts and Dijksterhuis (2000; experiment 2) showed that when the goal associated with a habit and the goal associated with an implementation intention are the same, their consequences (i.e., goal operation) are also the same.

More recently, Papies, Aarts & DeVries (2009) showed that, although in the beginning these cue-behavior cognitive associations are important for the goal directed behavior to be attained, the effect of implementation intentions in the long run goes beyond these associations. The fact that by planning, people are asked to imagine the critical situation and formulate a behavior that responds to it and thus, envision the behavior that they should have in the future, is the defining key to make these goal-directed associations stronger. Thus, according to the authors, a mere learning of this association without this, wouldn't be enough to promote the desired behavior in the long run, and this imagination and future behavior simulation is necessary for implementation intentions to be effective. This was demonstrated in their longitudinal study, which involved a comparison between a control condition, an associative learning condition and an implementation intentions condition, in different moments in time. Results showed that although initially both the associative learning condition and implementation intentions condition had the same effects, only the latter demonstrated long-lasting behavioral effects (one week after the intervention). The implication of this is that the procedures and time involved in this cue-behavior association are some of the factors that determine if they are successful. However, these cue-behavior

associations can also be more or less constrained, depending on the context where the behavior takes place and these are also factors that should be taken into consideration. The way in which the cognitive changes involved in the planning associated with implementation intentions can be inhibited/constrained or facilitated by the context, is the aim of the studies to be presented in this chapter. However, we first need to understand the different conditions that can induce these inhibitions/constraints or the facilitative effects.

WHEN IMPLEMENTATION INTENTIONS "BREAK" HABITS

The similar consequences from habits and implementation intentions only take place when the behavioral goals underlying habits and implementation intentions are the same. When there are conflicting goals, the situation is different.

Accordingly, research shows that implementation intentions developed with a goal X are successful in changing behaviors that are performed habitually associated with a goal Y, i.e., implementation intentions can "break" habits. In support of this Aarts *et al.* (1999) showed that developing implementation intentions while performing a habitual behavior, disrupts performance of the behavior such that the goal associated with that implementation intention was pursued instead. In their study, students were asked to go from the lab (located near the central hall) to the cafeteria sometime after being provided with a goal to collect a coupon halfway (in the secretary office of the Department of Operation and Statistics). This was aimed to interrupt the habit of going directly from the central hall to the cafeteria. Regarding this, half the participants were requested to develop a plan to collect the coupon (goal related), describing when (time of the day), where (location) and how (path) they would do so. The other half did the same type of plan but for spending the coupon after its collection (goal unrelated). Results showed that participants who received the goal related implementation intention were much more successful in collecting the coupon (80%)

compared to the control group (50%). Also, the former showed an enhanced access to environment-related words associated with goal attainment. This is evidence that implementation intentions allowed the ("artificial") creation of new cognitive associations between situation and behavior and a heightened accessibility of the situational cues associated with attaining the goal.

Some studies in the environmental behavior domain also investigated this effect, although the examples regarding this are scarce. One of the exceptions comes from the work of Bamberg (e.g. 2002a; 2002b). In one study (Bamberg, 2002a) he investigated the promotion of public transportation use (a new behavior), for university students that habitually use private transportation. Half of the participants had to develop an implementation intention to use public transportation while the other half was only provided with the relevant goal intention. To participate in this study the criteria was that they have never used the public transportation before and that they frequently used the private transportation network (based on a frequency measure of habitual behavior). Also, only the ones that volunteered as testers of a new route (public transportation) participated in the study, to assure a high level of intention in the performance of the new behavior. Thus, the dependent measure was the actual use of the new route instead of the habitual route. The experimental manipulation involved the development of an implementation intention, with the participants being asked the following: "Now we want to help you to plan and prepare the test of the university circular bus route as well as possible. For this purpose you should commit yourself to one specific day and opportunity/situation within the next 7 days when you will really conduct the bus-route test" (Bamberg, 2002a; p. 402). As an incentive for participating, a lottery (with prizes around 52 Euros in total) was offered. Results showed that participants benefited from the implementation intentions, with 53.3% trying the new public transportation route, compared to 31.1% that only had the goal intention. Moreover, results

regarding a logistic regression performed on the dichotomous variable route use vs. non-use for each group showed that in the implementation intention group only the goal-intention had a significant influence over results. For the control group, both the goal intention and an interaction between the goal intention and habit strength had a significant influence over the participant's choice. In summary, results seem to indicate that the implementation intention was successful in the initiation of a new behavior in a new context (new travel route). On the other hand, when the implementation intention was not developed, behavior was influenced significantly more by an interaction between the (public transportation) goal intention and (private transportation) habit strength. This shows that a goal intention alone was not sufficient to successfully initiate behavior and to overrule habits influence.

In a second study, Bamberg (2002a) analyzed the effect of implementation intentions on organically produced food purchase in a local bio-food shop. Participants were requested to be "test buyers", i.e., buy organic food in a local shop at least once in the following week, been given a voucher to do so. They were chosen as testers if they never or rarely bought organic food in the past. The dependent measure was the number of vouchers collected in the local shop by the research assistants. As in study 1, they developed implementation intentions in the following way: "From experience we know that you are more likely to carry out your intention to test within the next 7 days the bio-shop 'Klatschmohn' if you make a decision about the exact day and time-point you will do so. Decide now at which day and exact time-point you will test the bio-shop within the next 7 days. Please write that day and time-point on the next sheet of the questionnaire" (Bamberg, 2002a; p. 406). Additionally the voucher's value was manipulated, with half being given a 2.5 Euros voucher and the other half a 7.5 Euros voucher, in order to see if the monetary incentive had any influence over the decisions. The aim was to assess if action initiation was facilitated via motivational means (monetary incentive), via volitional means (implementation intention) or both. Results showed that the

higher percentage of vouchers used by the participants was in the implementation intention group which received the 7.5 Euros voucher (60.8%), followed by the group with only the 7.5 Euros voucher (54.3%), the group with the 2.5 Euros voucher plus the implementation intention (50%) and finally the group with only the 2.5 Euros voucher (34.2%). However, differences between the results of the first three groups didn't show significant differences, meaning that using high monetary incentives (7.5 Euros) or implementation intentions doesn't show any differences. The explanation given was that the monetary incentives might imply the development of implementation intentions by the participants themselves (such as 'To get this attractive special offer, I have to go to the shop as soon as it opens'; Bamberg, 2002; p. 406). According to Bamberg (2002a), in this case the two types of implementation intentions would overlap and produce no combined effect (as also shown in Bamberg, 2002b).

WHEN HABITS "BREAK" IMPLEMENTATION INTENTIONS

Other studies show that the effect of implementation intentions in breaking habits is not so straightforward and might not occur under certain conditions. For example, Verplanken and Faes´s (1999) field experiment showed that the formation of implementation intentions to eat a healthier diet was successful in following through with it for the people with healthy behaviors, which added to the previous behavioral intentions effect. However, for the participants with unhealthy (counter-intentional) habits this effect occurred only for habit unrelated aspects and wasn't sufficient to break the negative influence of prior habits (e.g. made them eat more fruit while the consumption of food with fat was unchanged). Given this discrepancy in results, there are some reasons to believe that habits are being underestimated, given that implementation intentions don't work in every situation. The findings from this study seem to indicate that implementation intentions success might be reduced or inexistent

if we develop them in a habitual and familiar context. Accordingly, in this study (Verplanken & Faes, 1999), implementation intentions were successful in adding "new behaviors" to the already existent global set of habitual behaviors (as in Aarts *et al.*, 1999) but not in developing a new behavior by breaking the habits, i.e., participants developed new healthy behaviors (e.g. eating more fruit) that added to the previous unhealthy behaviors (e.g. eating unhealthy snacks).

Other studies also cast some doubts on the success of implementation intentions in changing behaviors. For example Betsch, Haberstroh, Molter and Glockner (2004) showed that due to the action of situational constraints - time pressure - the effects of habit were maintained even after an implementation intention was formed. This contradicts studies showing the effect of implementation intentions in changing behaviors even under high cognitive load (Brandstätter, Lengfelder & Gollwitzer, 2001). In their study (Betsch *et al.*, 2004), participants first learned a certain routine, by pairing a color and a destination (city). This pairing was done by embedding it in a path-finding task, consisting on a maze (subway map) in which they had to find the path for a train to reach a certain city and draw it with a color pen. This was followed by other procedures with the aim of pairing the colors and cities, with variations in the frequency of pairing (2 to 14 times) which allowed the creation of two groups of participants with weak and strong routines. A second phase involved the formation of intentions to comply with certain rules, either consistent with the previously learned routines or which deviated from them (new choice rules, different from the one's previously learned). These rules involved the memorization of 4 "if-then" statements (e.g. "If I am asked to travel to A-town, then I will choose the red line; Betsch *et al.*, 2004; p. 66), thus involving the development of implementation intentions. Regarding this, the "consistent" group had to implement intentions to maintain the previously learned routine, while the "deviating" group had to implement intentions to deviate from the previously

learned routine. In either case, these intentions implementation was done under different time pressure conditions. The dependent variable was the false choices or relapse errors in judging the pairs of colors-cities appearing in a serious of 80 choice trials, when they had the "deviant" condition comparing to the "maintenance" condition. Results showed that implementation intentions failed under time pressure with the effects of habit being maintained, i.e., more errors and relapses to the previously learned routine were done even though the implementation intentions were developed to deviate from that routine. According to the authors (Betsch *et al.*, 2004) this indicates that cognitive constraints can cut the link between intentions and behavior, even if an implementation intention is formed with the aim of strengthening those links. Thus, cognitive constraints can destabilize implementation intentions and thus constrain its positive effect over behavior. However it should be noted that in this study this was only demonstrated for newly developed implementation intentions and the consistency in the memorization of the rules (4 statements) was not as great as the consistency in the routine learning (14 pairings).

Apart from this, few research has assessed the stability of implementation intentions and its effects, before the process becomes automatic (i.e., before a new habit is developed, following from an implementation intention). In fact, it is argued that the stability of the intentions is a moderator of their impact on behavior (Ajzen, 2002) and thus, given that a goal intention is the basis for an implementation intention development, the same can be said about the latter. However, only the pre-conditions for the success of implementation intentions and for increasing their stability have been identified so far (e.g. Parks-Stamm, Gollwitzer & Oettinggen, 2007; Sheeran *et al.*, 2005; Sniehotta, Nagy, Scholz & Schwarzer, 2006), while the conditions that can induce instability and specifically the context's role in that, have not been considered.

Therefore, stability seems to be an important precondition for the implementation intentions success and for this stability to occur there should be a frequent pairing between the situation and the goal intentions in order for behavior to turn into a stable and "frozen" habit. However, there are reasons to believe that some habits are stronger than implementation intentions when in an initial stage of their development. This is because, implementation intentions involve the creation of a temporary construct in the beginning of their development, before changing into a habit. Differently, habit is as a chronic construct (Aarts & Dijksterhuis 2000) which confers to it some particularities regarding cognitive activation and accessibility.

First, it is argued that the more accessible a construct is (i.e., "the readiness of stored knowledge to be used"; Higgins, 1989, 115) the higher the probability of its use, with the frequent activation of the construct increasing its accessibility (Higgins, 1989). Second, automaticity research has shown that chronic constructs are more powerful in longer intervals between priming and judgment, i.e., although having the same effects as temporary constructs, after a short period the chronic tendencies tend to dominate (Bargh, Lombardi & Higgins, 1988; Bargh, 1997). These are especially important given that when there are multiple behavioral representations, behavior will be guided by the one with the highest activation level (Aarts & Dijksterhuis 2000). Consequently, it is inferred that this will happen for strong habits when the necessary environmental cues for its activation are present, since it is a chronic construct that has had the opportunity to be activated more times and therefore is more accessible (and thus, stronger; Fazio, 1990). In this view, an accessible habit can function as a barrier to intentional behavior initiation, without people being consciously aware of its effect (Bargh & Chartrand, 1999). Moreover, even if implementation intentions break habits, if they don't gain chronic characteristics, habits should return in the long-run.

Besides this, another gap in the research on the relationship between habits and implementation intentions has been the role of the decisional context characteristics, i.e., which environmental features can facilitate or inhibit their mental representations. As we said before, success has been demonstrated in the development of new behaviors in new contexts (Bamberg, 2002a; 2002b) and at the same time in the "tuning" of habits (changing some components of an already existent habit) in habitual contexts. However there is a lack in the demonstration of their success in promoting completely new behaviors when the habit cuing situational features are still present, i.e., the context remains stable and facilitative of habits.

One prediction regarding this comes from the literature on dual models of social information processing, which implies that an *effortful decisional context* is more favorable to heuristic processing and an *effortless decisional context* is more favorable to systematic processing (Eagly & Chaiken, 1993). Thus, since in the initial stage of its development, implementation intentions involve a more systematic processing associated with a heightened attention focused on specific environmental cues (Gollwitzer *et al.*, 2005), it is expected that they should be less successful on complex decisional situations which can involve effort and constrain this type of cognitive processing (as seen in Betsch *et al.*, 2004).

In accordance with this, a study by Dewitte, Verguts and Lens (2003) showed that the implementation intention's success depends on the goal difficulty associated with it. In their study, people forming implementations intentions for easy goals benefited from the former. However, there were no positive effects when certain types of difficult goals were associated, specifically when people focused more on the outcomes than on the actions themselves. This is because according to them: "difficult goals for which the actions that are required to reach them have not been imagined yet do *not* benefit from implementation intentions" (Dewitte *et al.*, 2003). Also, Verplanken *et al.* (1997) showed that participants with a strong habit followed a more heuristic processing using less information and more superficial and non-

compensatory information search strategies (leaving information relevant to alternatives to their habitual behavior uninspected), compared to weak habit participants. The latter used more elaborated information search and inspected equal amounts of information for each option.

Given that many behaviors are complex in nature, a great deal of self-regulation processes and action control is needed in the development of new intentional behaviors (Sniehotta *et al.*, 2006). Accordingly, planning, time, frequency of the intentions implementation into actions (i.e., frequency of goal-action pairing) and the context facilitative features (the presence of cues that elicit the goals associated with implementation intentions) being very important in this. Therefore, we have reasons to doubt that a onetime institution of an implementation intention might be sufficient to break habits and develop into a completely new behavior (as shown e.g. in Bamberg, 2002a; 2002b), when there are no changes in the habitual context and if implementation intentions do not "stabilize" and consolidate. Differently, implementations intentions success might be increased if the context is changed in order to facilitate the goal directed desired behavior, i.e., if the context becomes more facilitative of this response.

WHEN ARE WE REALLY BREAKING?

Following from what was said before, we have reasons to doubt the success of implementation intentions in initiating a new behavior, before they develop into a new habit, when there are no changes in the context, i.e., as long as it remains stable and familiar (i.e., facilitative of habit). This is because, in spite of the interesting results regarding the implementation intentions effect as "habit breakers", some questions can be raised regarding the success of the procedures involved in achieving this, especially to what concerns environmental behavior change.

In the first example given (Aarts *et al.*, 1999) regarding change in a habitual route, participants didn't actually have to perform a completely new behavior but to add a "new step" to an already existent behavior. This was done within a familiar and habitual context. On the contrary, participants in the two Bamberg's (2002a) studies had to initiate a completely new behavior, which they never or at least rarely performed before. However, in this case the behavior wasn't expected to be performed in a habitual and familiar context (habitual travel route in study 1 or habitual supermarket in study 2) but in a new context (new travel route in study 1 and new food buying shop in study 2). Thus, implementation intentions didn't actually change a habit in a habitual context in this latter example, but created a new (one time) behavior in a new context. Moreover, implementation intentions also didn't completely change the habit in the first example given but actually "tuned" it, i.e., they changed some aspects of the habitual behavior but not the overall behavior (going from the hall to the cafeteria). Consequently, nothing is said in these and other examples in the literature on environmental habit change through implementation intentions, regarding their power in developing a completely new behavior within a familiar and habitual context.

This is in accordance with Holland *et al.* (2006; p. 77), who consider that a habit breaking effect has to be demonstrated by "stably changing an old behavior that was frequently performed within a specific context into new behavior that is repeatedly performed within that same context". Studies on ecological behavior mostly show the facilitation of new behaviors in new contexts (e.g. Bamberg, 2002a) and consider implementations intentions as a good technique to break habits independently of the context. One exception is the Holland *et al.* (2006) study. In their study, they aimed to promote new waste disposal behaviors in a set of Telecom company departments, thus breaking the previous habit of disposing the same type of waste – paper and plastic cups - in their personal waste bins. They did this not only by changing the habitual context - installation of new personal bins, apart from the already

existent general recycling bins at the department - but also by developing implementation intentions. These involved a plan regarding the when, where and how they would recycle the paper and plastic cup waste, therefore associating the habitual behavior cues (empty cup; paper) with a new goal to dispose the waste in the proper recycling bin. For this, they measured behavior by weighting the paper and the number of plastic cups disposed in the personal wastebaskets (and not in the recycling bins) for some days at the end of the work day (without participants knowing this), in four moments of measurement: 1) before the intervention; 2) one week; 3) two weeks and 4) two months after it. Results showed that the paper disposal in the personal bin decreased either in a condition in which the new personal bins were installed or when implementation intentions were developed (and both), compared to a condition in which the bins weren't installed. For plastic cups, this decrease was only obtained in the implementation intentions condition. Thus, while for certain behaviors a change in context might be enough to promote a new behavior (paper disposal), for other behaviors (plastic cups) this might not be the case and a cognitive change based on implementation intentions is needed.

The findings of the Holland *et al.* (2006) study show that the behavioral change didn't imply adding a new behavioral step to an already existent behavior (as in Aarts *et al.*, 1999), but developing a completely new behavior inside an habitual and familiar context (unlike Bamberg, 2002a), which maintained its effects even two months after the intervention. This study represents an exception in the area of proenvironmental behaviors, and still more studies are needed in order to assess the efficacy of implementation intentions in changing environmental habits within a familiar and habitual context. Nevertheless, the Holland *et al.* (2006) study, albeit important in defining this, doesn't say anything regarding what happens when there are context changes after the intervention, i.e., if the context destabilizes the cognitive change achieve with the implementation intentions. In their case, this would

represent for example a worker moving from a context in which the habitual recycling behavior is stable to a new department in which this behavior would be constrained. Given this, our studies propose to study not only the implementation of a new behavior within a familiar and habitual context but also the effect of implementation intentions when context changes occur.

STUDY 4 – WHEN HABITS "BREAK" IMPLEMENTATION INTENTIONS

According to Holland *et al.* (2006) for a habitual behavior to be changed in a habitual context, the planning needs to link a new behavioral response to the already existent habit activation cues. However, there are some contexts in which this is not possible. For example, if you have a decision situation (e.g. being in the supermarket section in which you want to buy a certain product) in which there is a choice of organic vs. non-organic products, the organic choice cannot be promoted by associating it with the non-organic products, given that usually both categories are mutually exclusive (e.g. people usually don't buy the same type of milk both in its organic and non-organic versions; they usually buy one or the other). In this case the new choice needs to be associated with new cues and not with the habit activating cues (as in Holland *et al.*, 2006), for the behavioral change to occur.

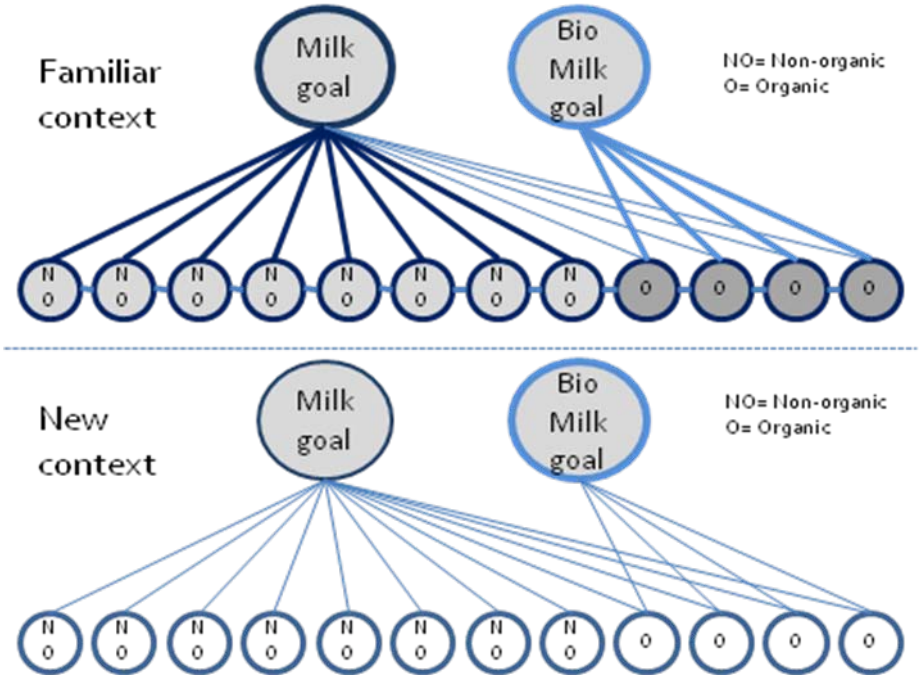
The problem with this situation is that, given that you can only associate the organic choice with the cues that can elicit that same choice (e.g. organic products or brands), the implementation intentions effect can be constrained if the habitual behavior cues (e.g. non-organic products or brands) have a higher activation potential than the organic choice cues (e.g. due to a high perceived applicability associated with non-organic choice). Given this, we aim to assess the effect of the prior development of an implementation intention to buy organic products in interaction with the applicability effect from study 1 (see previous

chapter). This implementation intention will be directed towards the facilitation of the desired response (choose the organic option), using the procedure from Bamberg (2002a). This type of implementation intentions is considered to be of type 2 (Gollwitzer *et al.*, 2005), differing from type 1 - oriented towards the suppression of the undesired response (e.g. not choosing non-organic) – and type 3 – oriented towards taking the attention focus of the critical situation (e.g. not choosing at all in a certain context).

By using this type of implementation intention our prediction is that it will have no effect in a familiar (habitual) context, i.e., in overruling the effect of a high perceived applicability on the first decision made, and thus results from study 1 will be replicated. As said before, this is because in the familiar context, the new response cannot be associated with the habit activation cues (as proposed by Holland *et al.*, 2006) but instead has to be associated with new cues. Also, given the perceived applicability effect, the habit activation cues are predicted to have a higher activation potential than the organic choice activation cues. Thus, even with an implementation intention, this won't be enough to overrule the habitual behavior activation from the habit activation cues. In a different way, in the new context this perceived applicability is lower and there is no expectance of a stronger connection between the non-organic buying means and the habit (see study 1 in the previous chapter), i.e., the context is less facilitative of habit. Consequently, more attention should be given to the alternative non-habitual organic means, due to a heightened attention following from the implementation intention to buy organic food (characteristic of a type 2 implementation intention). In other words, in this context, the development of a connection between the organic choice and its activating cues (organic means) should be facilitated given that they are not competing as much with habit activation (as in the familiar context).

A graphical representation of these predictions regarding the implementation intentions effect can be seen in Figure 8.

Figure 8. Goal-means structure representation for each type of context, when preceded by the development of an implementation intention to buy organic products.



Given that the same procedure of study 1 will be used, we will also assess the implementation intentions effect on the second and third decisions. Regarding these, the same facilitative effect of the new context should be found and thus there should be a higher interference with the consistency in the choice of non-organic products observed in study 1. To test our predictions, participants performed a web based study (experimental field study), in which they were asked to choose three times (different products) in a list of 4 organic and 8 non-organic milk products, chosen through a pre-test, being randomly assigned to two between-participants conditions: 1) familiar context: high perceived applicability for non-organic milk buying habit; 2) new context: low perceived applicability for the non-organic milk buying habit.

METHOD

Participants and Design. 80 students from the *University of Lisbon* and other participants were either given credits for their participation or volunteered to participate respectively. To participate they had to fulfill the criteria of buying food products for domestic consumption at least once in two weeks. For this reason, the students that participated were requested to bring in their parents or friends that fulfilled these criteria, if they didn't.

The sample consisted mainly on young adults, with an overall mean age of 29.46 years old (*SD* = 11.51; *Min* = 18; *Max* = 61) and the majority having a high school degree (53.80%) or a university degree (35%). A questionnaire (see description below) portrays them as frequent shoppers, shopping for food on an average of twice a week (*M* = 1.81, *SD* = 1.08). Also, the sample is characterized by a low percentage of reported organic food products bought in general (*M* = 10.81%, *SD* = 12.72), with 98.7% of the participants having only 50% or less of the total amount of products they buy being organic products and a medium intention to buy organic food in the future (*M* = 3.76, *SD* = 1.94), portraying them as habitual non-organic food buyers.

Procedure. Participants were asked to take part in two web-based studies, one on "Health and Consumption in Portugal" ministered by the research group in Social and Environmental Psychology and one on "Real and Virtual Shopping Environments" by the research group in Consumer Psychology. These represented two parts of the same study but were presented as such in order to reduce the perceived connection between them.

After providing the informed consent, they performed a web-based questionnaire (see Appendix XV) regarding organic and diet products and were told its aim was to assess the type of decisions people make in web-based environments. This was the same questionnaire as in study 1 with the difference being the implementation intentions task. In this, they were

asked to develop implementation intentions (Gollwitzer, 1999) to buy **organic** products[27]. For this they had to go to a supermarket web store, in which they had to choose four products and then go back to the questionnaire, and insert them in the provided spaces. Moreover, they had to develop a plan to buy each product on the following week (adapted from Bamberg, 2002a), in terms of the "how much" (quantity/weight), "where" (shop/supermarket), "when" (day of week & time of day/hour) they expected to buy the products. This also allowed them to familiarize with the online shopping environment, given that their familiar environment is the local shop or supermarket (only a small percentage of people buy food products online). Thus, by the time they performed the choice task this environment wouldn't be so new to them and they would have practice in implementing intentions in this kind of environment.

Context applicability manipulation. Two days after this task, participants were requested to participate in what they thought was the second study, consisting on a decision making task aimed to assess the type of decision people make in web-based environments. This used WebPages for simulation of online shopping, comprising HTML pages developed with the use of the Comersus Cart Software (Comersus Open Technologies L.C., 2004), which is a software package used in the creation of online shopping web pages. The construction of the HTML forms for the storage of the participants data on a web server, used *SurveyWiz* (see Birnbaum, 2001), a software used for the development of online surveys.

First, people were given the option to choose one of four different categories of products and told to press one of four buttons for that. However, this was only to allow for a perceived randomness in the attribution of products, increase their motivation and reduce the possible frustration of having only one category of products, with no other available options. Thus, every button led to the same product category: milk. After choosing the category, a page appeared with the "random" category attributed – milk - and the instructions for the

[27] In study 1 this was done for diet products.

decision making task. In these, people were requested to choose the product they would most probably buy from a list and told that the product would be given to them, after completion of the study. They were also asked to choose two additional options, just in case the first option wasn't available in stock, i.e., their second and third preferences in case the first wasn't available. This procedure was based on the one created by Coates, Butler and Berry (2004) to study the effect of priming on the choice of familiar brands.

After the instruction, the list of products appeared, consisting of 12 UHT Semi-skimmed milk options with 8 non-organic and 4 organic options (proportion of .66 and .33 respectively) showing the price, brand and a picture of the product for each. Both the familiar and new context's had the same type of products and matched prices in a fixed position, with the only difference being the product pictures and brand names – Portuguese brands in the familiar context and United Kingdom brands in the new context. The participant's attribution to the familiar or new context tasks (between participant's tasks) followed from their random attribution to the experimental conditions. This derived from a mathematical formula in Microsoft Excel (generation of random numbers between 0 and 1) and sorting of participants email list by column.

Final questionnaire. Finally, after choosing three products from the same list available, participants responded to a short web questionnaire, with manipulation checks and other socio-demographic variables. The first of the manipulation checks asked the level of influence (in a 5-point Likert type scale from "no influence at all" to "strong influence") of a list of factors over the participants decision in the previous tasks, namely: color of the webpage; sound environment; organization of the products on the webpage; distance from the computer; their habitual behavior; price of the products and other factors. The color, sound and distance aspects were inserted only to make the others less salient. The second check, asked how frequently they buy the 3 brands chosen (1 to 5 scale, from "never" to "four times

or more") and the future intention to buy organic products (to retest the intention measure from two days before).

After completion of the web questionnaire, participants were thanked for their participation and provided with an email contact in the case they wanted additional information and/or to receive the study results.

RESULTS

Questionnaire and Manipulation Checks. Regarding the baseline characteristics of the sample, the *t*-test for independent samples results show that there are no significant differences between the familiar and new context conditions, in terms of habits perceived influence over the choice, percentage of organic food bought in general, intention to buy organic food in the future and frequency of shopping in general. The only difference found referred to the perceived influence of habit over the decision to choose the milk products on the decision tasks, with the participants on the familiar context condition considering it influenced significantly more their decision (M = 5.98, SD = 1.29) compared to the participants in the new context condition (M = 4.98, SD = 1.69), $t(78) = -2.98$, $p = .004$, $d = .67$[28]. Also, the participants in the familiar context task, reported an average frequency of buying the first product chosen of three times a month (M = 4.15, SD = 1.03), and the second and third on an average of once per month (second product: M = 2.55, SD = 1.32; third product: M = 2.13, SD = 1.09)[29]. Additionally, there were no significant differences between the intention measure in the first and second moment (2 days after) of the study. Finally, concerning the checks and sample characteristics there are no significant differences between study 1 and the present study.

[28] Cohen's *d* was calculated following from the formula created by Thalheimer and Cook (2002).

[29] On the scale from 1 to 5, the value 1 represented "never" and 5 represented "four times or more".

To what concerns the influence of the products price in the webpage used as the decision task, the frequency table analysis shows no clear pattern of choosing the products in accordance with their prices (see Table 21).

Table 21 - Choice frequencies for the three decisions made by context, price and webpage position

	Milk brand	Webpage position	Price (Euros)	Frequency of choice 1st choice	2nd choice	3rd choice
Familiar context	*Mimosa*	2	0.59	10	12	6
	Agros	10	0.60	1	2	4
	Seleccionado Matinal	6	0.76	11	7	4
	Terra Nostra	12	0.56	6	1	6
	Continente	5	0.44	1	2	2
	Vigor	11	0.70	4	2	7
	Gresso	3	0.52	0	8	5
	Pingo doce	4	0.40	3	1	2
	*Agros Bio**	9	1.39	4	2	3
	*Purnatur**	7	1.93	0	0	0
	*Président Bio**	1	1.69	0	3	0
	*Andechser Natur**	8	1.70	0	0	1
New context	*Nature's way*	6	0.59	4	3	3
	Tiffany	4	0.60	3	3	2
	Asda	10	0.76	2	2	3
	First choice	12	0.56	2	0	6

Waitrose	7	0.44	0	4	0
Devondale	11	0.70	6	5	5
Harvey	1	0.52	4	3	5
Ultra	5	0.40	3	2	1
*Heritage organic**	3	1.39	4	6	4
*Organic Valley**	9	1.93	4	5	1
*Moo's organic**	8	1.69	4	2	5
*Rachel's organic**	2	1.70	4	5	5

* Organic products.

To further analyze this possibility, we recoded the data into two categories of products: low price (below .70 Euros) and high price (above .70 Euros). Regarding either the choice made in the familiar context or the choice made in the new context, overall results with the *Binomial test* show no significant differences between the choice frequencies in the two price categories, in each of the three decisions made. The only difference found was for the second decision in the new context, with significantly more high price products (.64) chosen than low price products (p = .018), and for the third decision in the new context, with marginally significantly more high price products (.61) chosen than low price products (p = .057)[30].

Given that the products position in the webpage was fixed between decisions (which could have introduced a bias in the choice participants made), we performed a check in order to assess it. The analysis of the frequency table shows no clear pattern of choosing the products in accordance with their prices (see Table 19). To further analyze this possibility, we recoded the data into two categories of positions: top (aggregating the choice of the 6

[30] This is result is due to the fact that they chose more organic products in the third decision, being most of them in this "high price" category.

products on the webpage's top) and bottom (aggregating the choice of the 6 products on the webpage's bottom). Regarding the choice of organic vs. non-organic products made overall, results with the *Binomial test* show significant differences between the choice frequencies in the two position categories for the second choice, with more products chosen at the top (.69) than the bottom (p = .001). Regarding either the choice made in the familiar context or the choice made in the new context, results with the *Chi-square test* show no significant differences between the choice frequencies in the two position categories, for the first and third decision made. To what concerns the second decision, results with the *Chi-square test* show a significantly higher proportion of products chosen in the top in the familiar context (.83) than in the bottom χ^2 (1, N=80) =7.04, p = .007. For the new context no significant differences are found.

Decision Making Task. Binomial test results for the first choice in the familiar context show a significantly higher proportion of non-organic milk chosen (.95) than an expected proportion that would have been obtained by chance[31] (.66) (p = .000; Binomial). For the new context, these differences are non-significant. To what concerns the differences in the non-organic milk choice between the familiar and new context, Fisher's Exact test results show that there is a higher proportion of non-organic products chosen in the familiar context (.93) compared to the new context (.65) (p = .003; Fisher's exact test), with no significant differences between the proportion of organics chosen in the familiar or the new context compared to study 1. The results concerning Fisher's Exact test can be seen in Table 22.

[31] With this representing the actual proportion existent in the choice list for the first decision the participants made.

Table 22 - Differences in frequencies between the familiar and new context choices with Fisher's Exact test

	Non-organic	Organic	Non-organic proportion.	One-tailed (right)
Familiar context	37	3	.93	$p = .003$
New context	26	14	.65	

Chi-square test results for the three consecutive choices made in the familiar context show that the decisions made are significantly different from the results that would have been obtained by chance for the dependents events, either associated with the choice in the first decision and then the choice in the second, χ^2 (3, N=40) =23.01, $p = .000$; associated with the choice in the second decision and then the choice in the third, χ^2 (3, N=40) =23.01, $p < .005$; and associated with the choice in the first decision and then the choice in the third, χ^2 (3, N=40) =31.00, $p = .000$.

These results can be seen in Table 23.

Table 23 - Differences between choice frequencies for the four combinations of consecutive product choices with the Chi-square test – Familiar context (n=40)

		Choice frequency		Composite Chi-square (df=3)	P
		Expected	Observed		
1st decision vs. 2nd decision	NO-NO	16.8	34	26.47	.000
	O-O	3.6	2		
	NO-O	9.6	3		
	O-NO	9.6	1		

2nd decision vs. 3rd decision	NO-NO	18.4	31	19.37	.000
	O-O	4	0		
	NO-O	10.4	4		
	O-NO	10.4	5		
1st decision vs. 3rd decision	NO-NO	18.4	33	24.79	.000
	O-O	4	0		
	NO-O	10.4	4		
	O-NO	10.4	3		

O = Organic; NO= Non-organic

With respect to the three consecutive choices made in the new context, chi-square test results show that the decisions made are significantly different from the results that would have been obtained by chance, for the dependents events either associated with the choice in the first decision and then the choice in the second, χ^2 (3, N=40) =31.11, $p < .001$; associated with the choice in the second decision and then the choice in the third, χ^2 (3, N=40) =23.01, $p < .001$; and associated with the choice in the first decision and then the choice in the third, χ^2 (3, N=40) =31.00, $p \approx .05$. These results can be seen in Table 24.

The probabilities calculation which served as a basis for determining the expected frequencies for the Chi-square test are shown in Appendix VII.

Table 24 - Differences between choice frequencies for the four combinations of consecutive product choices with the Chi-square test – New context (n=40)

		Choice frequency		Composite Chi-square (df=3)	P
		Expected	Observed		
1st decision vs. 2nd decision	NO-NO	16.8	22	37.12	.000
	O-O	3.6	13		
	NO-O	9.6	4		
	O-NO	9.6	1		
2nd decision vs. 3rd decision	NO-NO	18.4	21	31.34	.000
	O-O	4	13		
	NO-O	10.4	2		
	O-NO	10.4	4		
1st decision vs. 3rd decision	NO-NO	18.4	23	29.21	.000
	O-O	4	12		
	NO-O	10.4	13		
	O-NO	10.4	2		

O = Organic; NO= Non-organic

McNemar's test results regarding the differences between decisions in the familiar context (see Table 25) show a high significant consistency (i.e., choice of non-organic milk between two decisions) across the three decisions, with the highest consistency being between the first and second decisions (85%).

Table 25- Differences in frequencies between decisions in the familiar context with McNemar's test

		Organic	Non-organic	Consistency	McNemar (A/D)	McNemar (B/C)
1st decision (rows) vs. 2nd decision (columns)	Organic	2	1	85%	*p* = .000	*p* = .617
	Non-organic	3	34			
2nd decision (rows) vs. 3rd decision (columns)	Organic	0	5	77.5%	*p* = .000	*p* = 1.000
	Non-organic	4	31			
1st decision (rows) vs. 3rd decision (columns)	Organic	0	3	82.5%	*p* = .000	*p* = 1.000
	Non-organic	4	33			

Results regarding the differences between decisions in the new context (see Table 26) show no significant consistency between the three decisions, with the highest being between the first and third choices (57.5%).

Table 26 - Differences in frequencies between decisions in the new context with McNemar's test

		Organic	Non-organic	Consistency	McNemar (A/D)	McNemar (B/C)
1st decision (rows) vs. 2nd decision (columns)	Organic	13	1	55%	*p* = .176	*p* = .371
	Non-organic	4	22			
2nd decision (rows) vs. 3rd decision (columns)	Organic	13	4	52.5%	*p* = .230	*p* = .683
	Non-organic	2	21			
1st decision (rows) vs. 3rd decision (columns)	Organic	12	2	57.5%	*p* = .091	*p* = 1.000
	Non-organic	13	23			

To what concerns the differences in choice consistency between study 1 and 4 (see Table 27), results show that there are no differences in the familiar context between both studies and a slightly higher consistency in the choice of non-organic in the new context for study 1 compared to study 4, where this consistency is non-significant (see Table 23).

Table 27 - Differences in non-organics choice consistency between study 1 and 4

	Study 1 (no ImIn)		Study 4 (InIm)	
	Familiar context	New context	Familiar context	New context
1st decision vs. 2nd decision	77.5%**	55%	85%**	55%
2nd decision vs. 3rd decision	72.5%**	55%	77.5%**	52.5%
1st decision vs. 3rd decision	87.5%**	55%*	82.5%**	57.5%

* Result significant at p<.05
** Result significant at p<.001

Specifically, there are small differences between the second and third decisions, with a slightly higher consistency in the choice of organic between study 4 (32.5%) and 1 (27.5%), a slight reduction in the percentage of those who chose non-organic from the second to the third decision between study 4 (15%) and 1 (10%) and a slight increase in the percentage of those who chose organic from the second to the third decision between study 4 (5%) and 1 (2.5%). Differences are also found between the first and third decisions, with a higher consistency in the choice of organic between study 4 (30%) and 1 (17.5%) and a slight reduction in the percentage of those who chose non-organic from the first to the third

decision between study 4 (15%) and 1 (5%). All these differences proved to be non-significant with the *Difference Between Two Proportions*[32].

DISCUSSION

We predicted that the development of an implementation intention to buy organic products would increase the proportion of organics chosen in the new context on the first decision made, comparing to study 1. The results refute this and show a complete replication of study 1 results, with the participants choosing significantly more non-organic milk in a familiar context compared to a new context, with no significant differences in these proportions between study 1 and the present study. There are some reasons that can be attributed to this result.

First, the type of implementation intentions that was used, oriented towards the facilitation of the desired response, is not adequate to develop a new behavior within a familiar and habitual context and the results supported our prediction regarding this. This is because, the organic buying goal is not associated with the non-organic habit eliciting cues and there are no changes in the context cues which elicit the habitual behavior and in the cues that facilitate the desired behavior (Holland *et al.*, 2006). Even though some means to attain the goal to choose organic were present, there were still means strongly associated with the habitual behavior and no alterations in the perceived applicability occurred, with this allowing for the same effect in study 1 to occur. Another explanation for this is that the goal associated with the implementation intentions development (buy organic food) is an abstract goal. This implies that the implementation intentions developed might not have competed directly with the specific behavior to choose non-organic milk (Holland *et al.*, 2006). Thus,

[32] Found in the *Statistica* 6.0 statistical analysis software.

the connection between behavior and the organic buying goal might have been made for other products, other than milk, and thus the cognitive changes achieve for this product weren't strong enough to increase the organic milk buying goal. Nevertheless, although the goal provided was abstract, the participants had not only to make a plan to choose organic in the following week, but also to choose some products and include then in the plan, while making it (see the procedure section). Consequently, the abstract goal was expected to be made concrete during the plan development and thus the implementation intentions were developed towards various specific products. However, further post-hoc analysis supports this failure given that regarding all the products chosen during the plan development, milk was only chosen 13.75% of the times.

Despite of these reasons for the implementation intentions not being powerful enough to decrease the proportion of non-organics chosen in the familiar context, we expected an increase of organic products chosen in the new context, given that habit is more constrained in it. In other words, in this context the implementation intentions shouldn't compete directly with the specific behavior to choose non-organic milk, given that habit is supposed to influence less the decisions in this context. Thus, due to the fact that the context wouldn't be familiar and habitual anymore, people would be expected to link the new behavioral responses to the new situation (Holland *et al.*, 2006). Surprisingly, this was not the case.

One reason for this to have happened, apart from the goal concreteness justification, has to do with the fact that the organic buying intentions, in which the implementation intentions were based, were medium and not sufficiently high to produce stability enough for the implementation intentions to have an effect (Sheeran *et al.*, 2005). In other words, for the paths between the goal to buy organic products, the goal to buy milk and the potential organic milk buying means to develop and get stronger. Moreover, the fact that the implementation intentions were developed two days before the decision, might have not also allowed for this

stability and enough time for cognitive associations to be created or strengthened. In fact, although it is argued that a onetime institution of an implementation intention is enough to produce an automatic elicitation of the intended behavior under the same circumstances (Ajzen, 2002; see Golwitzer, 1999), the same is not said when changes in the context take place and about what is needed (the preconditions) for the implementation intentions to have an effect in this situation.

In agreement, few research has assessed the stability of implementation intentions and its effects, in the early stage of its development before automaticity in behavior is achieved. Accordingly, it is argued that stability of the intentions is a moderator of the impact of intentions on behavior (Ajzen, 2002; Conner, Sheeran, Norman & Armitage, 2000). However, nothing is said about the conditions that can induce this instability and specifically the role of habit in this sense. In our view, even though the intention to buy organics remained stable between the two moments of the study (within the two days), the habit also remained stable given that there were no changes in the decision context (and the habit activating cues) during that time. Thus, the cognitive changes that were achieved with implementation intentions haven't achieved enough strength to counteract the "frozen" habit.

Another possibility is that implementation intentions produced an effect in an opposite direction of the suppression effects found in study 2. Thus, by asking people to develop them by going to the supermarket online store and select the organic products in accordance (see procedure), might be seen as goal activation followed by goal attainment within that task (in the same way as what happened in the habitual goal priming task in study 2). Consequently, by the time that they made the decision (two days after this task), the goal was already attained before and thus didn't need to be pursued again. This could only be assessed with implicit measures of goal activation after the development of implementation intentions and two days after, before the decision making task, in order to assess this. Although goal

suppression effects are found in the literature, nothing is said about if they would last for two days, although decay with time is expected to occur (Liberman, Förster & Higgins, 2007). Nevertheless, there are reasons to believe that this was the case for some participants given that the significant percentage of participants that revised their choice between the first and second choices found in study 1 wasn't found in the present study and the proportion of non-organics and the consistency in their choice was higher in the present study. Also, the participants in the present study that decided in the familiar context reported being more influenced by their habits in the decision made than the ones in the new context, which was not found in study 1. Thus, implementation intentions seemed to have had the effect of suppressing the organic buying goal activation in the new context and thus, increasing the consistency in the choice of non-organics between contexts.

One final explanation is that, as our results from study 2 and 3 demonstrated, in the new context the habitual behavior can still determine choice. Consequently, as long as people have a strong habit, they can still substitute the habitual means by new means if they still allow for goal attainment (Kruglanski *et al.*, 2002). However, given that in the present study we didn't measure habit directly but only with perception based measures (e.g. frequency of organic food buying), this can only be inferred to have happened. Nevertheless, there are some reasons to believe that this was the case given that the implementation intentions failure occurred mainly for the first decision.

In fact, to what concerns the effect on the second and third decisions, we have reasons to believe that implementation intentions did have an effect, especially in the third choice made. Still, this wasn't strong enough to interfere with the choice of non-organic products but only with the choice of organics, showing that habit was still followed by some participants in the new context and that implementation intentions were successful mainly in association with their non-habitual choices. Comparing to study 1, results indicate that the

implementation intentions effect occurred only in the new context, given an increase in the consistency in organic products choice and a decrease in the choice of non-organics from one decision to the next. This translated into a non-significant consistency found between the first and third decision, which in study 1 was significant. The same happened in a lower degree for the consistency between the second and third decision, for which there was an almost significant difference in study 1, the same not being found in study 4. Finally, there are also reasons to believe that the organic choice was more goal directed (associated with the implementation intentions) compared to study 1, given that the "departure" from chance was overall significantly higher in this study than in study 1 independently from the context. This was especially the case for the third choice in the new context, for which in study 1 the choice almost approached chance and in the present study was significantly different from it.

Overall, this might indicate that the reasons for the implementation intentions failure didn't have so much to do with the level of goal intention or that only two days were allowed for stabilization in them, but more to do with the actual processes involved in each context, i.e., the failure as to do more with the context characteristics than with a failure in the methodology used. Also, this is in accordance with the organic buying goal suppression explanation given that this was the case mainly for the first decision. Thus, given time to think and follow a more systematic procession of the information (after following the heuristic processing associated with habit in the first choice), this suppression could be overruled for some participants. However, it remains untested if this was the case only for the participants with more unstable mental representations of the goal system (i.e., weak habit participants, which were the ones that in study 2 benefited from goal priming). For this, future studies should use habit measures to assess this specifically.

Implementation intentions can have an effect when the context is less facilitative of habits (less familiar), although this appears to happen only over the consistency in the choice

of organic but not over the non-organic choice consistency, given that no significant alteration was produced in that. This is in accordance with the Verplanken and Faes´s (1999) study, given that they found an implementation intentions effect over habit unrelated aspects, producing an increase in the consumption of non-habitual products while maintaining the same amount of habitual products consumed as before. In our study this would correspond to the organic products choice, given that there were no changes in non-organic choice consistency with our without implementation intentions. Also, this is in accordance with the Holland *et al.* (2006) reinterpretation of Verplanken and Faes´s (1999) study, given that in our study the goal associated with the implementation intentions was also abstract and milk was involved in the plan development only for a small percentage of the participants. Thus, the effect was only found mainly in the new context and for the second and third decisions, and only for those participants to which the implementation intentions weren't in competition with habit (Holland *et al.*, 2006).

Given all this, we think the implementation intentions success in changing behavior in a familiar context would be increased if we directed the response towards the inhibition of the undesired response, additionally to directing it towards the facilitation of the desired response. The latter procedure seems not to be enough in breaking the type of consumption habits we studied, in the early stages of implementation intentions development. This is because in the decision making contexts we assessed, the planning cannot link a new behavioral response to the already existent habit activation cues (i.e., the organic choice cannot be made by buying non-organic products) as proposed by Holland *et al.* (2006). Instead, in this type of decision making context, the new behavior has to be linked to new cues (organic means) and at the same time attention given to the "old" cues has to be inhibited and the associated goal activation to be suppressed. This implies that the success in behavioral change through implementation intentions should also involve a change in some

aspects of the decision context (Holland *et al.*, 2006), in order to facilitate more the choice of organic products, i.e., the cognitive change should be accompanied by changes in the context cues. These aspects will be assessed in the next study.

STUDY 5 – WHEN IMPLEMENTATION INTENTIONS "BREAK" HABITS

Study 4 analyzed the effect of a type 2 implementation intention – directed towards the facilitation of the desired response (Gollwitzer *et al.*, 2005) - and showed that if the context is not facilitative of it (i.e., is more facilitative of an alternative response), their effect is constrained. In the study, participants who developed implementation intentions had not only to initiate a new behavior by cognitively linking the desired goal (choose organic) to the critical situation (milk buying situation), but also had to inhibit the habitual behavior. This habitual behavior was inferred to have a stronger cognitive connection with the non-organic milk buying means present, compared to the connection between the organic means and the temporary increase in the organic milk buying goal. Thus, the cognitive changes based on the creation of a link between the organic buying milk and the choice situation weren't strong enough to suppress the habitual behavior in a familiar context.

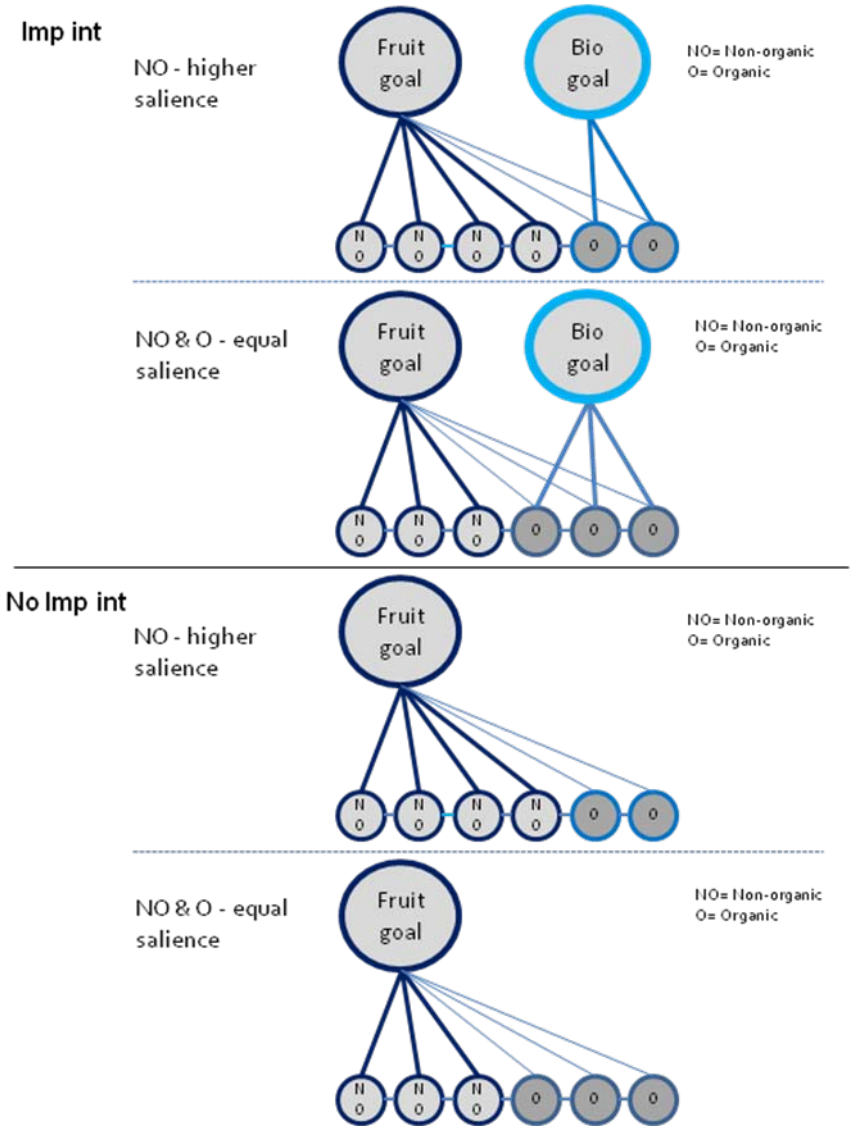
In other words, the formation of implementation intentions resulted in the mental representation of the organic milk buying goal being more cognitively accessible in the choice situation. This was expected to facilitate the selective attention involved in the detection of the presence of organic milk buying means and respond in accordance with it (Gollwitzer *et al.*, 2005; Aarts *et al.*, 1999). However, given the higher perceived applicability of the non-organic means and a more frequent co-occurrence in the past with the non-organic milk buying goal, the accessibility of the non-organic buying goal was still higher than the organic milk buying goal. Between the organic milk buying goal and the

organic milk buying means this past frequent pairing didn't occur so often or didn't occur at all. In fact, the implementation intentions only started to have their effect when the participants had to choose in a new context (less facilitative of habit and with a lower perceived applicability associated with it) for the second and third choice. In spite of still being influenced by habit in the new context, the fact that they had to choose again might have started a choice monitoring process. This was what allowed for the selective attention given to the organic buying means to be increased and choose accordingly, although only for participants which we infer to have an unstable or weak habit.

Given that in study 4 the new context was still not facilitative enough and habit was still followed in the first decision, in study 5 we will try to overrule this. In the present study the same type of implementation intentions were used but this time the context was manipulated in order to increase the selective attention given to the organic buying means (increased awareness due to an increase in the context salience of the means; Higgins, 1996). For this, price and availability of organic and non-organic products were manipulated in order to facilitate more the choice of organic products. Although we manipulated price and availability, we only did so in order to manipulate the organic vs. non-organic means salience. Thus, as said in chapter 2, we define these context differences not in terms of "incidental" features but in terms of "essential" features, given that the manipulation of these means in terms of salience implies the manipulation of features "central" to the decision. Differently from studies 1 to 4 in which these differences and changes in the contexts didn't favor the alternative response to the habitual choice, in the present study these changes are aimed at favoring the implementation intention to buy organic in one of the contexts. Thus, we predict that when implementation intentions are developed, more organic products will be chosen in a facilitative context with equal price and availability of organic and non-organic products, compared to a context in which there is a lower salience of the organic buying

means (less availability and higher price). A graphical representation of these predictions regarding the implementation intentions effect can be seen in Figure 9.

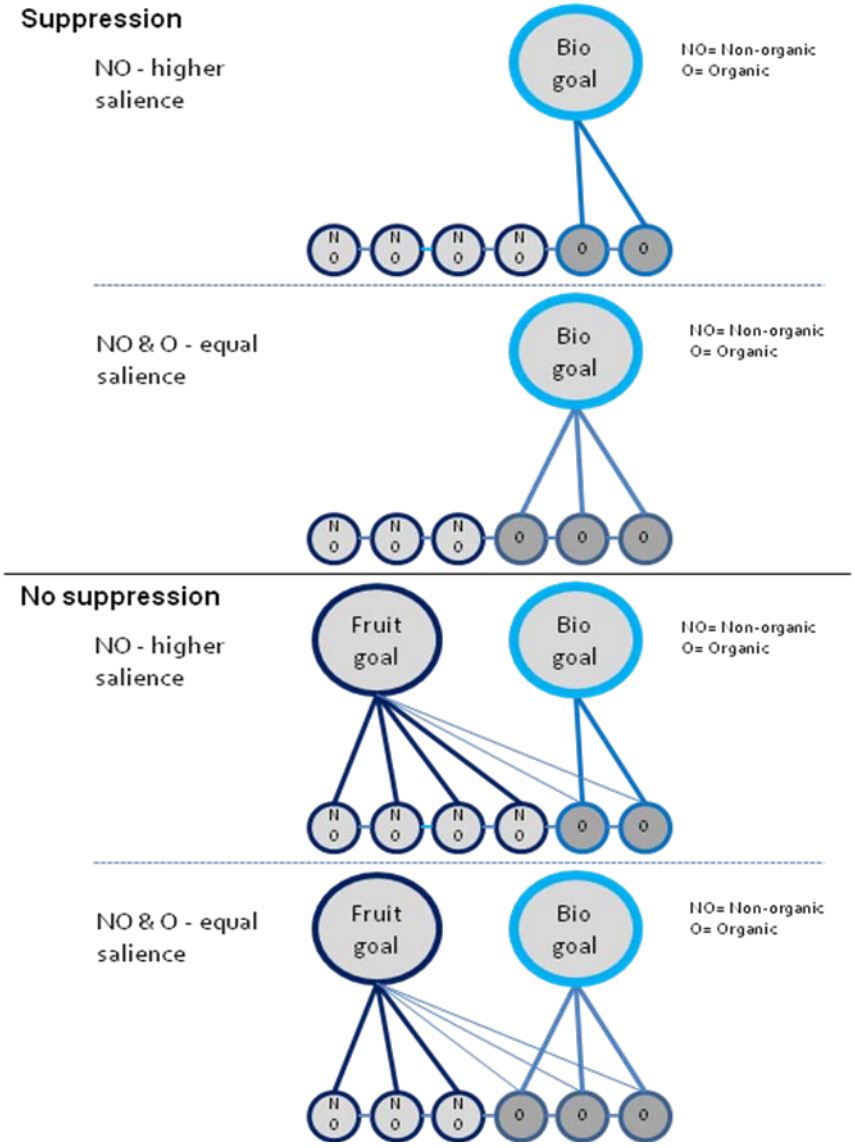
Figure 9. Goal-means structure representation for each type of context, preceded or not by the development of an implementation intention to buy organic products.



Moreover, we think the implementation intentions success in changing behavior will be increased if the response were to be directed towards the inhibition of the undesired response, additionally to directing it towards the facilitation of the desired response. This is because this latter procedure is not enough to break habits in the early stages of implementation

intentions development (as seen in study 4). With this aim, after the implementation intentions development, we used the goal priming procedure from study 2 in order to produce a similar suppression effect found in it. Therefore, a procedure which is close to the type 1 implementation intentions (oriented towards the suppression of the undesired response) was added to the type 2 implementation intentions. A graphical representation of these predictions regarding the implementation intentions effect can be seen in Figure 10.

Figure 10. Goal-means structure representation for each type of context (manipulated in terms of means salience), with or without suppression of the habitual goal.



To test our prediction associated with changes in the decision context and the prediction regarding the positive effects associated with a suppression effect from goal priming, two similar studies were designed to test each of them. In study 5a, participants were randomly assigned to two between and two within-participants conditions respectively, in an experimental design of 2 (with vs. without implementation intentions) X 2 (low organic means salience vs. equal salience). Additionally, differently from study 4, there was a one week interval between the implementation intentions development and the choice in the decision making tasks. The aim of this procedure was to start the development of the relevant goal-action links and therefore artificially create the goal-dependent automaticity (see Gollwitzer, 1999) with this week interval allowing for the cognitive changes to gain stability overtime (Conner *et al.*, 2000) and for the strength in the cue-behavior association to be increased (Papies *et al.*, 2009).

In study 5b, participants were randomly assigned to two between and two within-participants conditions respectively, in an experimental design of 2 (implementation intentions with a target goal vs. with an irrelevant goal) X 2(low organic means salience vs. equal salience). Unlike in study 5a, participants made the decisions right after the implementation intentions development, therefore allowing to study the effect of goal suppression (found in study 2) without the intervention of the time factor. By doing this, we can study their effect as an "aid" to the implementation intentions development in the beginning of the process and thus, as an effective technique in one-time interventions to change behavior.

METHOD – STUDY 5a

Participants. 39 students from the University of Plymouth were given credits for their participation in two studies, the first concerning of a general survey on "Food production and consumer behavior in the United Kingdom" (UK) and the other a study on consumers "Shopping behavior in internet based environments".

Regarding the sample characteristics, a questionnaire (see description ahead) portrayed them as frequent shoppers, going shopping for food almost twice per week (M = 1.85, SD = 1.09). Also, the sample is characterized by a high percentage of non-organic fruit buying in general (M = 87.95, SD = 11.69) and in the previous week (M = 82.75, SD = 11.18). No participants reported buying less than 50% of non-organic food in both.

Questionnaire and implementation intentions. After providing their informed consent when registering to participate in the experiment, participants received a questionnaire on "Food production and consumer behavior in the UK" by email and were asked for it to be sent back through the same way to the researcher after responding to it.

The questionnaire started with information regarding organic food (see Appendix XVI) and its definition according to the UK standards. The information was the same for every participant in order for the term "organic" to be equally accessible to everyone and to control for the knowledge level, given that prior information can affect the decision (Bettman & Park, 1980). This consisted of questions designed to assess sample characteristics such as: 1) the number of times per week the participant shopped for food; 2) the percentage of organic vs. non organic food bought; 3) the goal intention to buy organic food in the following week (5-point Likert type scale from 1 - "very weak" to 5 - "very strong"; adapted from Ajzen, 2002; Bamberg, 2002).

In addition to responding to the questionnaire, half of them were asked to develop implementation intentions (Gollwitzer, 1999) to buy **organic fruit** (the product used in the

following decision making task). Accordingly, they were asked the following (adapted from Bamberg, 2002): “From experience we know that you are more likely to buy organic food if you develop a specific plan regarding where, when and how you will do so. First think carefully about your plans for the upcoming week, and make a specific plan for where and when you will shop for food. Following this, please indicate your plans for buying organic fruit when you shop for food in the next week - write down what type of fruit you will buy and how much.”

Context manipulation. One week after the questionnaire, the participants came to the lab and were requested to perform a new study (see Appendix XVII) on “Shopping behavior in internet based environments”, with two online shopping tasks consisting of a simulation to assess shopping behavior in an internet environment. Given this, they were told that “although this is a simulation you should think of it as if you are actually buying”.

Before performing the two tasks, they were asked to make a written description of what they would do in a situation in which they had to buy supermarket products for their weekly breakfasts. This aimed to familiarize them with the type of decision processes (regarding supermarket products) they had to report in the subsequent decision making tasks.

The subsequent two tasks comprised the choice of two types of fruit - apples and oranges - within a choice of organic vs. non-organic of one type of fruit per task. The choice of the fruit category is justified by the *Consumer purchase habits questionnaire* from study 1 (pre-test), in which 41% of the participants reported it in the top 5 products frequently bought with a moderate to high level on the SRHI between $M = 6.25$, $SD = .60$[33] if it was the first product chosen and $M = 4.67$, $SD = .81$ if it was chosen in the second place. Moreover, this fruit category was chosen because it allowed finding two different products within the same

[33] This high result is due to the fact that this value represents the average of only 3 participants (the only one’s that chose fruit as the most bought product).

category, namely oranges and apples. If, for example, we used the same category as in study 1 and 2 but with the option of semi-skimmed milk and skimmed milk, those two products wouldn't be seen as different but as variations of the same product. Also, using the same product would be seen by the participants as strange and artificial, because the only difference between them would be the price and availability (thus, the manipulation would be more "visible"). Also, the use of the fruit category allows for an assessment in which brand involvement, brand preferences or a brand semantic priming effect are controlled for, being only studied the preference for particular types of fruit. Finally, although we chose these two types of fruits, the goals associated are expected to be part of the same goal system and therefore, activating the general goal of buying fruit should activate the orange and apple buying sub-goals.

Based on this, participants performed the two online shopping tasks, which comprised HTML pages developed with the use of the Comersus Cart Software (*Comersus Open Technologies L.C*. 2004) and HTML forms developed through *SurveyWiz* (see Birnbaum, 2001). The types of oranges and apples included in the each of the decision making tasks resulted from on a market study performed by visiting a random set of supermarkets online shopping WebPages in which these were the types of fruit that were more available and with more different categories to buy from.[34] The two tasks corresponded to a within-participant manipulation of the organic means salience. This involved a reduction of the number of options available, from 12 (study 1 to 4) to 6 options. The aim was to make the means associated with organic fruit buying less salient in one context (less means available comparing to the non-organic buying means) - lower salience condition - and equally salient

[34] Although these two types of fruit involve different behavioural patterns in their purchase and decision to buy, this might introduce some confound in the results. However, due to the fact that they are the two types of fruit most bought should make them more similar, than if other types of fruit were chosen.

in the other context (same number of organic and non-organic options available) - equal salience condition. The lower organic means salience condition included a choice of oranges, within a list of 4 non-organic (.66 proportion)[35] and 2 organic products available, with a higher price for the organic products compared to the non-organic. The equal salience condition included the choice of apples, within a list of 3 non-organic and 3 organic products available (equal proportion) with similar prices. Additionally, in both conditions, the participants had a "more information" option for each product that could be pressed in order to assess additional information regarding the product, with the message "this information is not available at the moment" if pressed. This was included as a manipulation check to see if the participant's decision process reflected a more systematic or heuristic processing of the information[36].

To test for order effects, one group completed the lower salience task (oranges) first followed by the equal salience task (apples), while the other group did the reverse order. Moreover, to prevent the influence of the products position in the web page, although both products categories appeared in the same page, this position was varied. Thus, the two orders of presentation mentioned were manipulated by fixing the oranges products on top and the apples in the bottom of the webpage in one of the conditions (oranges-apples order) and reversing the positions in another condition (apples-oranges order).

Finally, in these tasks participants were requested to think-aloud while choosing the product (see Bettman & Park, 1980; Yang, 2002), by reporting everything they were thinking and the way they were deciding (which was preceded by a practice example regarding the

[35] The proportion was the same as in study 1, although here the reduction of the options available from 12 (study 1) to 6 aimed at increasing the salience of this difference.

[36] It is inferred that if they follow their habit, the need to search more information won't be as high as in the case where they don't follow their habit (Verplanken *et al.*, 1997).

choice of current movies to see at the cinema)[37]. The choices made by the participants were recorded on a sheet, regarding the option of orange/apple chosen (from 6 available) and its type (organic or non-organic).

Final questionnaire. Finally, after choosing one product in each task, participants responded to a short web questionnaire, with manipulation checks and other socio-demographic variables, such as: 1) perceived influence of habit on the decisions made (5-point Likert type scale from 1 - "extremely weak" to 5 - "extremely strong"); 2) percentage of organic vs. non-organic food bought in the previous week; 3) goal intention to buy organic fruit during the following week (same measure as in the initial questionnaire). The last two aimed to assess the consistence of these when compared to the answers given in the week before. After completion of the questionnaire, participants were debriefed about the specific aims of the study and expected results and asked about the perceived influence of the manipulations over their choices. None of the participants reported being aware of this influence.

RESULTS – STUDY 5a

Questionnaire and Manipulation Checks. Regarding the baseline characteristics of the sample, the *t*-test for independent samples results show that there are no significant differences between the with and without implementation intentions conditions, in terms of habit perceived influence on the decisions made and other sample characteristics measures (e.g. intention).

Regarding the intention to buy organic food in the following week, there was an increase in the overall sample between the low intention measured at home (M = 2.30, SD =

[37] The data resulting from the think-aloud procedure was recorded but the qualitative information in it wasn't analysed in this thesis and will be the subject of a future study regarding it.

.98) and the moderate intention measured one week later at the lab (M = 3.05, SD = .95), $t(19) = -3.68$, $p = .002$. The difference between the percentage of organic food bought in general and bought in the previous week was non-significant. To what concerns the influence of products price in the webpage used as the decision task, the frequency table analysis shows no clear pattern of choosing the products in accordance with their prices (see Table 28).

Table 28 - Choice frequencies for each type of fruit by context, price and webpage position

	Fruit Type	Webpage position[38]	Price (Pounds)	Choice Frequency
Lower salience context (oranges)	*Seville*	1	1.39	4
	Seville Organic	2	2.23	6
	Navelina	3	1.25	5
	Finest	4	2.45	3
	Jaffa Organic	5	1.99	10
	Jaffa	6	1.14	11
Equal salience context (apples)	*Braeburn*	7	1.30	4
	Braeburn Organic	8	1.35	11
	Gala Organic	9	1.22	11
	Gala	10	1.14	3
	Pink Lady Organic	11	2.24	4
	Pink Lady	12	2.19	6

[38] This position was randomized in two order conditions, with one type of fruit first in one condition (products 1-6) and last in the other (6-12) and vice-versa for the other type of fruit. No significant order effects were found.

To further analyze this possibility, we recoded the data into two categories of products: low price (aggregating the three products with the lowest price) and high price (aggregating the three products with the highest price). Regarding either the choice made in the high salience context or the choice made in the equal salience context, overall results with the *Binomial test* show no significant differences between the choice frequencies in the two price categories.

Binomial test results regarding the choice of the option to search for "more information", showed a significantly higher percentage of participants not selecting that option (.74) than the ones selecting it (p= .003; Binomial). Moreover, Chi-square test results show no significant differences in this, between the conditions with or without implementation intentions.

Regarding order effects, results from the *Fisher's exact test* applied to *Gart's test for order effects* (see Everitt, 1977) show no differences between the low salience-equal salience and the equal salience-low salience orders.

Decision Making Task. Chi-square test results for the consecutive choices made in the low salience and equal salience contexts show that the decisions made are not significantly different from the results that would have been obtained by chance for the independents events, both in the implementation intentions condition and in the condition without implementation intentions. The probabilities calculation which served as a basis for determining the expected frequencies for the Chi-square test are shown in Appendix VII.

McNemar's test results regarding the differences between decisions in the lower and equal salience contexts when no implementation intentions are developed (see Table 25) show no significant differences in the consistency of organic and non-organic choice between contexts (McNemar A/D) and no significant differences in the revision of the choice between contexts (McNemar B/C).

McNemar's test results regarding the differences between decisions in the lower and equal salience contexts when the implementation intentions are developed (see Table 29) show a significantly higher percentage of participants which revised their choice, by choosing the non-organic option in the lower salience context and the organic option in the equal salience context (40%) compared to the opposite revision (0%) (p = .013; McNemar). Regarding the consistency in the choice of organic and non-organic options between contexts, there are no significant differences.

Table 29 - Differences in frequencies between decisions in the low vs. equal salience contexts for the participants with vs. without implementation intentions, with McNemar's test

Without Implementation Intentions					
		Equal salience context			
		Organic	Non-organic	McNemar (A/D)	McNemar (B/C)
Lower salience context	Organic	6	3	p = 1.000	p = .724
	Non-organic	5	5		
With Implementation Intentions					
		Equal salience context			
		Organic	Non-organic	McNemar (A/D)	McNemar (B/C)
Lower salience context	Organic	7	0	p = .773	p = .013
	Non-organic	8	5		

METHOD – STUDY 5b

Participants. 42 participants volunteered to participate[39] and were paid 3£ for their participation in two studies, the first concerning a general survey on "Food production and consumer behavior in the UK" and the other, immediately after it, a study on consumers "Shopping behavior in internet based environments". From these, 2 participants were dropped out given that they reported buying less than 50% of non-organic food in general and in the previous week.

Regarding the sample characteristics, a questionnaire (see description ahead) portrayed them as frequent shoppers, going shopping for food at least twice per week (M = 2.10, SD = 1.06), fruit almost twice per week (M = 1.70, SD = 1.04) and candy less than once per week (M = .82, SD = 1.11). Also, the sample is characterized by a high percentage of non-organic fruit buying in general (M = 80.68, SD = 16.15) and in the previous week (M = 82.00, SD = 16.09). Additionally, the participants reported a frequency of organic food buying between "rarely" and "sometimes" (M = 2.70, SD = 1.16).

Questionnaire and implementation intentions. After providing their informed consent upon arrival at the lab, participants were requested to fill a questionnaire on "Food production and consumer behavior in the UK"

The questionnaire started with the same information regarding organic food (see Appendix XVIII) and its definition according to the UK standards, used in study 5a. This consisted of questions designed to assess sample characteristics such as: 1) the number of times per week the participant shopped for food, fruit and candy; 2) the percentage of organic vs. non organic food bought; 3) the frequency of organic food purchase (5-point Likert type scale from 1 - "never" to 5 - "always"); 4) the goal intention to buy organic food in the

[39] Collected from the participant's pool of the School of Psychology, University of Plymouth.

following week (5-point Likert type scale from 1 - “very weak” to 5 - “very strong”; adapted from Ajzen, 1991; Bamberg, 2002); 5) perceived probability to buy organic food in the following week (5-point Likert type scale from 1 - “extremely improbable” to 5 - “extremely probable”; corresponding to a self-prediction measure as identified by Sheppard, Hartwick & Warshaw, 1988); 6) perceived difficulty to buy organic food in general (5-point Likert type scale from 1 - “extremely easy” to 5 - “extremely difficult”; corresponding to a perceived behavioral control measure; adapted from Ajzen, 1991).

In addition to responding to the questionnaire, half of them were asked to develop implementation intentions (Gollwitzer, 1999) to buy **organic products**. Accordingly, they were asked the following (adapted from Bamberg, 2002): “From experience we know that you are more likely to buy organic food if you develop a specific plan regarding where, when and how you will do so. First think carefully about your plans for the upcoming week, and make a specific plan for where and when you will shop for food. Following this, please indicate your plans for buying organic food when you shop for food in the next week - write down what type of food you will buy and how much.”

The aim of this manipulation was to start the process of development of the relevant goal-action links and therefore artificially create the goal-dependent automaticity (see Gollwitzer, 1999). It should be noted that this manipulation asked the participants to identify organic products and not specifically organic fruit (as in study 5a), which is the aim of the decision making task and habit manipulation. The objective is to assess the effect of the development of an implementation intention through the activation of a superordinate goal (buy organic food) in the same level as the goal associated with the intention, which can subsequently be implemented in the relevant situation (buy fruit). Moreover, not developing implementation intentions associated with organic fruit prevents this concept - “fruit” - from

being activated at the time of the goal priming task, which could increase the accessibility of the habit associated with fruit buying (but not candy).

Goal priming manipulation. Immediately after completing the questionnaire, the participants were requested to participate in a new study on "Shopping behavior in internet based environments". In this, half of them were asked to write a brief description of their behavior in a certain situation (after being presented with a practice example): "*Imagine that you are going to buy food for yourself in the supermarket/local store and take it home. Once you get there, you start shopping and then you realize that you want to buy fruit. Please describe what you would do from the time you arrive at the fruit section until the time you choose the fruit, describing the options available and the way you make your choice*." In study 5a the participants did this only for candy, with no relevant goal manipulation involved. In the present study, additionally to this candy condition (irrelevant goal) representing the control condition, half the participants did this for fruit instead of candy, thus constituting the target (fruit) goal priming group.

Context manipulation. Immediately after the goal priming manipulation, the participants were requested to perform a new study on "Shopping behavior in internet based environments", with two online shopping tasks consisting on a simulation to assess shopping behavior in an internet environment. This followed the same procedure as in study 5a.

Final questionnaire. After choosing one product in each task, participants responded to the same short questionnaire as in study 5a. After completion of it, participants were debriefed about the specific aims of the study and expected results and asked about the perceived influence of the manipulations over their choices. None of the participants reported being aware of this influence.

RESULTS – STUDY 5b

Questionnaire and Manipulation Checks. Regarding the baseline characteristics of the sample, the *t*-test for independent samples results show that there are no significant differences between the target vs. irrelevant goal priming conditions, in terms of habit perceived influence on the decisions made and other sample characteristics measures (e.g. intention).

Overall there is a moderate intention to buy organic food in the following week, with no significant differences between the intention measured in the initial and final questionnaire, *n.s.* Moreover, there is a moderate to low perceived probability to buy organic food in the following week, with a higher perceived probability in the end of the study (M = 3.40, SD = 1.36) compared to the beginning, before the experimental manipulations and decision tasks (M = 3.08, SD = 1.29), $t(39) = 2.82$, $p = .008$. Additionally, there is a low perceived difficulty to buy organic food in general (M = 2.42, SD = .90).

Finally, comparing the intention to buy organic food of the participants from study 5a at moment 1 (M = 2.30, SD = .98) and the study 5b participants intention (M = 3.07, SD = 1.26), the latter is significantly higher than the former, $t(60) = 2.41$, $p = .019$, $d = .69$.

To what concerns the influence of the products price in the webpage used as the decision task, the frequency table analysis shows no clear pattern of choosing the products in accordance with their prices (see Table 30).

Table 30 - Choice frequencies for each type of fruit by context, price and webpage position

	Fruit Type	Webpage position[40]	Price (Pounds)	Choice Frequency
Lower salience context (oranges)	*Seville*	1	1.39	3
	Seville Organic	2	2.23	11
	Navelina	3	1.25	10
	Finest	4	2.45	7
	Jaffa Organic	5	1.99	11
	Jaffa	6	1.14	18
Equal salience context (apples)	*Braeburn*	7	1.30	2
	Braeburn Organic	8	1.35	18
	Gala Organic	9	1.22	22
	Gala	10	1.14	14
	Pink Lady Organic	11	2.24	2
	Pink Lady	12	2.19	2

As in study 5a, to further analyze this possibility we recoded the data into two categories of products: low price (aggregating the three products with the lowest price) and high price (aggregating the three products with the highest price). Regarding the choice made in the high salience context, results with the *Binomial test* show no significant differences between the choice frequencies in the two price categories. Regarding the choice made in the equal salience context, results with the *Binomial test* show marginally non-significant

[40] This position was randomized in two order conditions, with one type of fruit first in one condition (products 1-6) and last in the other (6-12) and vice-versa for the other type of fruit. No significant order effects were found.

differences with a higher frequency of choice in the low price (.63) than in the high price category (p = .052).

Binomial test results regarding the choice of the option to search for "more information", showed a significantly higher percentage of participants not selecting that option (.72) than the ones selecting it (p= .001; Binomial). Moreover, Chi-square test results show no significant differences in this, between the implementation intentions conditions with the accessible target goal vs. irrelevant goal.

Regarding order effects, results from the *Fisher's exact test* applied to *Gart's test for order effects* (see Everitt, 1977) show no differences between the low salience-equal salience and the equal salience-low salience orders.

Decision Making Task. Chi-square test results for the consecutive choices made in the low salience and equal salience contexts, show that the decisions made are significantly different from the results that would have been obtained by chance for the independents events, in the implementation intentions condition with the target goal, χ^2 (3, N=20) =8.54, p < .025. In the implementation intentions condition with the irrelevant goal, the choice is not significantly different from chance. The probabilities calculation which served as a basis for determining the expected frequencies for the Chi-square test are shown in Appendix VII.

McNemar's test results regarding differences between decisions in the lower and equal salience contexts when the irrelevant goal is primed (see Table 27) show a significantly higher percentage of participants which revised their choice, by choosing the non-organic option in the lower salience context and the organic option in the equal salience context (30%) compared to the opposite revision (0%) (p = .041; McNemar). Regarding the consistency in the choice of organic and non-organic options between contexts, there is a higher consistency in the choice of non-organic (45%) than in the choice of organic (25%), although these differences are non-significant.

McNemar's test results regarding the differences between decisions in the lower and equal salience contexts when the target goal is primed (see Table 31) show a significantly higher percentage of participants which revised their choice, by choosing the non-organic option in the lower salience context and the organic option in the equal salience context (30%) compared to the opposite revision (0%) (p = .013; McNemar). Regarding the consistency in the choice of organic and non-organic options between contexts, there is a higher consistency in the choice of organic (40%) than in the choice of non-organic (20%), although these differences are not significant.

Table 31 - Differences in frequencies between decisions in the low vs. equal salience contexts for the participants with the target vs. irrelevant goal, with McNemar's test

Irrelevant goal					
		Equal salience context			
		Organic	Non-organic	McNemar (A/D)	McNemar (B/C)
Lower salience context	Organic	5	0	p = .423	p = .041
	Non-organic	6	9		
Target goal					
		Equal salience context			
		Organic	Non-organic	McNemar (A/D)	McNemar (B/C)
Lower salience context	Organic	8	0	p = .387	p = .013
	Non-organic	8	4		

Finally, by aggregating the frequencies regarding the participants that were consistent in the choice of organic and who revised their choice between contexts, results show that this percentage is higher in the target goal priming condition (80%) than in the irrelevant goal priming condition (55%), although not being significant[41] with the *Difference Between Two Proportions* test. Moreover, the consistency in the choice of non-organic is higher in the irrelevant goal condition (45%) than in the target goal condition (20%), although also not being significant[42].

DISCUSSION - STUDIES 5A & 5B

We predicted that the success of an implementation intention in increasing the amount of organic products chosen, would be greater if the context was changed in order to facilitate that choice. The results do not refute this and show that when implementation intentions are developed, significantly more organic fruit is chosen in the equal (organic means) salience context than in the lower (organic means) salience. When no implementation intentions are developed, the context doesn't facilitate the organic choice and no differences between them are found. This shows the context relevance in influencing decision making and specifically habit interaction with it, as a very important determinant, in this case the non-organic fruit consumption habit which is a particular type of fruit consumption habit not yet studied in research (see Brug, Vet, Nooijer & Verplanken, 2006).

This implementation intentions effect happens either when they are developed towards a more abstract target - organic food - and the decision is made right after this - study 5b - or towards a more specific one - organic fruit - and they are allowed one week to "stabilize" and

[41] The non-significance (p = .099) regarding this difference in 25% can be explained by the small sample being studied (n = 20 in each condition) which implied a low statistical power.

[42] *Ibidem.*

increase the cue-behavior strength (Papies *et al*., 2009) before the relevant decision - study 5a. However, their effect appears to be of a lower magnitude in the case of study 5b, given that this difference approached a marginally significant result in the irrelevant goal priming condition, compared to the condition with implementation intentions in study 5a. Moreover, it is important to note that the intention to buy organic food in the future was lower for study 5a participants one week before the decision compared to study 5b participants and that study 5a participant's intention increased significantly during that week. This seems to have benefited the implementation intentions and it might indicate that the cognitive connections developed by them, were strengthened during that time (Papies *et al*., 2009). Also, it is said that implementation intentions which involve more abstract goals (organic food) have a more reduced effect than when a more specific goal is involved (organic fruit), which can explain why the effects magnitude was lower in study 5b (with the same said to have happened in the Verplanken & Fae's (1999) study; see Holland *et al.*, 2006). Nevertheless, despite of the more abstract implementation intentions used, the goal priming used to produce a suppression effect involved a concrete goal to buy milk and thus, this effect might have been diminished. Therefore, differences in magnitude might have more to do with the one week interval rather than this goal concreteness. Nevertheless, this is just an inference and should be studied in future studies, in which goal abstraction can be manipulated, for example using two conditions of goal abstractness (implementation intentions for organic milk vs. organic products), and two conditions of goal priming in order to induce the goal suppression effect (organic milk vs. organic products goal priming).

Overall, these results are in accordance with research showing that the implementation intentions effect can be disrupted when there are changes in the goal intentions and context stability (e.g. Sheeran *et al.*, 2005; Sniehotta, Nagy, Scholz & Schwarzer, 2006), i.e., when contexts become more constraining (Betsch *et al.*, 2004). When this happens, people with a

strong habit are expected to follow a more heuristic processing using less information and more superficial and non-compensatory information search strategies (leave information relevant to alternatives to their habitual behavior uninspected; as shown in Verplanken *et al.*, 1997). This is expected mainly in the initial stages of the relevant cognitive linking (goal-action) associated with the implementation intentions, given that these links didn't have enough time and/or opportunity to become stronger. Thus, given that a great deal of self-regulation processes and action control is needed in the development of new intentional behaviors (Sniehotta *et al.*, 2006) and that this consumes many cognitive resources, it shouldn't be surprising that "unstable" implementation intentions are not strong enough to overcome the context constraining effects. On the other side, when the context becomes more supportive, their success is increased, as the results from the two studies (5a and 5b) show.

Apart from the facilitative characteristics of the context, we aimed to asses if implementation intentions could also be facilitated by inducing a suppression effect similar to the one found in study 2 (see previous chapter). Thus, we wanted to see if by priming supraliminally the buying goal associated with the habitual choice of non-organic means, this would increase the consistency in the choice of organic products between contexts. In other words, we expected that participants would choose not only more organic in the equal salience context but also more organic in the low salience context. The results refute this by replicating in the target goal priming condition the context effect found in the irrelevant goal priming condition and showing that the expected higher consistency in the choice of organic is non-significant.

Nevertheless, two aspects should be noted. First, although the effect in the target goal priming condition replicated the effect found in the irrelevant goal priming condition, its magnitude was higher in the former than in the latter and significantly departed from a choice by chance (unlike the choice made for the irrelevant goal condition and the conditions in

study 5a)[43]. Thus, not only the percentage of participants that chose non-organic in the low salience context and organic in the equal salience context was higher but also the effect was higher in significance. Also, it was the only result that actually demonstrated to be goal directed (choose organic) in interaction with the facilitative context and different from chance. Second, although the difference in the organic choice consistency between the two priming conditions is not significant, still the organic choice consistency is 15% higher and the non-organic consistency is 15% lower in the target goal priming condition compared to the irrelevant goal priming condition. Moreover, the aggregation of the participants consistent in the choice of organic and the ones who revised their choice between contexts (by choosing organic in the equal salience condition and non-organic in the low salience condition) shows that this percentage is higher in the target goal priming condition (80%) than in the irrelevant goal priming condition (55%)[44].

Therefore, although overall our prediction was refuted, results seem to indicate that by inducing habitual goal suppression, we might be "vaccinating" some people against habits "behavioral deviating" effect. This has some support in the self-regulation and goal attainment literature, which shows that in order to attain goals, some cognitive flexibility is needed in the sense that individuals need to resist the salient temptations with which the desired goals are in conflict (Fishbach & Shah, 2006). This can be seen as the blockage of unwanted influences or "temptations" by directing implementation intentions toward goal pursuit (Gollwitzer *et al.* 2005).

[43] It should be noted however, that the fact that the number of options available to choose from was reduced from 12 to 6 limits the choice strategies and preferences used and thus, can increase the probability that the choices are closer to chance. This could explain why in studies 5a and 5b this was the case but not in studies 1 to 4. Moreover, the fact that they had to think-aloud could have introduced some confound by introducing a more systematic processing of the information, although we have no way to asses that this was the case.

[44] Although this being non-significant for the reasons presented before.

In order for this to occur, the temptations can be made salient for the individual. This can be achieved by making people aware of the available behavioral options, including the desired (through the development of implementation intentions) and the undesired ones (through awareness). The downside of this is that it consumes attentional resources, i.e., when exerting effort, "self-regulatory resources become depleted, decreasing the ability to proceed with self-regulation" (Coelho do Vale, Pieters & Zeelenberg, 2008; p. 5). However, by inducing the suppression effect that we used, this amount of effort can be reduced given that in our view this happened in an automatic way without people being aware of it. Thus, self-regulatory measures that involve less effort like this one can be used, which can increase the success in the development of behavioral change strategies.

In spite of this, it should be noted that the suppression effect might be dependent on habit strength, which wasn't directly assessed in this study. Accordingly, participants more susceptible to suppress their non-organic goal might be the ones with strong habits ("stable" habits) in accordance with study 2 results. This prediction should be tested with future studies, in which habit strength is measured. Moreover, behavioral change techniques using this kind of suppression effect should be pitted against more effortful self-regulation strategies (e.g. asking people directly to avoid the use of their habits and consciously suppressing it), in order to access the success of each of them. To this, situational constraints (e.g. time pressure; task complexity; see e.g. Betsch *et al*., 2004; Verplanken & Faes, 1999) could also be added in order to assess if the benefits of goal suppression could be obtained with our manipulation (involving less effort) but not with techniques involving a higher level of consciousness.

To our knowledge, this "vaccine" effect hasn't yet been demonstrated in the habit research literature, although it might be seen as closely related to the classical inoculation effect found in the literature regarding persuasion (McGuire, 1964), which considers that

"being forewarned of a persuasion attempt can help people resist persuasion" (Smith & Mackie, 1995; p. 304). Accordingly, immunity to persuasive arguments can be achieved if we expose people to "small doses" of the infection, by rehearsing the counterarguments (inoculation; McGuire, 1964). In the same way, in order to prevent people from falling prey to habitual behavior, exposing them to their own habits might be a successful technique, given that it can be seen as a form of exposing them to the "virus", while implementation intentions allow for the desired response rehearsal. This prediction should be tested with future studies, given that the statistical power of our results is not enough to give a strong support for this.

GENERAL DISCUSSION

The studies presented show two main results: habits can "break" implementation intentions (study 4) and implementation intentions can "break" habits (study 5a and 5b).

Regarding the first result, when the context is familiar and facilitative of the habitual behavior, the decision is determined more by the habit than the implementation intentions, which have a low success in "breaking" the former. This happened when the means associated with the habitual behavior (non-organic means) were either more (4 non-organic in 6; study 5) or less contextually salient (8 non-organic in 12; study 4), while maintaining the proportion constant (.66 of the products in the choice list were non-organic). Also, this happened for two different categories of products, which seems to indicate that the effect is more due to the goal systems involved and the presence of a habit, than actually to the type of product or brand. Accordingly, the same effect was found both in a category (milk) for which familiar brands were included in the choice context, and in a category (fruit) without brands but with product sub-categories (e.g. Sevilla oranges). Thus, this effect goes beyond brand involvement and familiarity as a determinant of choice (see e.g. Coupey, Irwin & Payne,

1998; Quester & Smart, 1998) and rather than a cognitive effect, it shows the presence of a motivational effect apart from the brand.

Also, in study 4, the comparison of the results for the first choice between the familiar and new context seems to indicate that the first choice for the majority of the participants was the habitual choice. Thus, it seems that in this case even when the context is less facilitative of habit, the habitual behavior can still be followed. However, it should be noted that this is only the case because the new context is not completely new given that the product (milk) remains the habitual product even in the absence of brands and the two alternative categories (organic and non-organic) are still known categories. Thus, although the context changed in the features "essential" to the decision, the existent means still allowed goal attainment for some participants. In this regard, a new choice context for habitual cow milk consumers that involved a complete change in the "essential" features could be a choice of soya milk, with two alternative categories of "added calcium" vs. "added omega 3", for example. Nevertheless, it shows that habit can still be followed when there are "essential" changes in context and an alternative choice is made salient through implementation intentions.

Accordingly, apart for some reasons that might have constrained the implementation intentions effect, this effect was still found when participants had to choose more options after the first choice and especially on a third choice. This shows that when obliged to revise their choice, this revision can elicit a more systematic processing of the information because changes in the "essential" features of context occurred which lowered the perceived applicability of habit (less available means to achieve the goal). This seemed to be the case in our study, with participants making their first choice following a more heuristic processing. At the same time, when participants had to choose again, the revision seemed to involve a more systematic processing of the information, with this effect being higher for participants

who developed implementation intentions, i.e., implementation intentions seemingly induced a more systematic processing of the information but only on the second and third choices.

This showed that implementation intentions are important when adapting to new contexts (Betsch *et al.*, 2004) and that "deliberation can alter learned relations among goals, behaviors and affect" (Betsch *et al.*, 2004; p. 72), i.e., can "break" habits. Apparently, this only occurs when changes in the "essential" contextual features occur in a way that facilitates the implementation intentions and people are allowed time and opportunity to monitor and revise their choices in accordance with them. However, this deliberation consumes cognitive resources because it demands cognitive control over owns choices and behavior in order for the achieved changes to last (Betsch *et al.*, 2004). Therefore, if they don't achieve automaticity and the associated cognitive connections are not strengthened (i.e., if they don't develop into a habit), it is expected that behavior falls back to the previous state (i.e., the habit takes over again). This affirmation, however, can only be assessed with a longitudinal methodology, which should be the aim of more studies in the future.

From this, it is clear that the context has an important role in allowing for implementation intentions to "break" habits. Although this effect wasn't shown for the first decision made in study 4, this was because the "new" context still allowed for the habitual behavior to occur and there were no big changes in the "essential" contextual features that could facilitate the desired response (choose organic). Also, for the planning to be effective, it needs to link a new behavioral response to the already existent habit activation cues. In both decision contexts studied (familiar and new) this wasn't possible, given that the organic choice could not be promoted by associating it with the non-organic products choice, given that both categories are mutually exclusive. Moreover, either in the familiar context or in the first choice made in the new context, the choice of organic means was in competition with a higher activation potential of the non-organic means. Thus, only in the second and especially

in the third decisions, was it possible to associate the goal to choose organic with the actual choice of organic, given that only then this connection was facilitated.

Due to the fact that the organic choice cannot be promoted by associating it with the non-organic products choice, in our view, the only way to facilitate this is by means of a change in the "essential" contextual features that accompanies the cognitive change. Accordingly, in study 5 the context was manipulated in order to increase the organic buying means salience, from a context in which this salience was lower than the salience of the non-organic means, to a context in which both organic and non-organic means were equally salient[45]. This increase in the organic means salience allowed for the implementation intentions to have an effect, with a higher number of organics being chosen in the equal salience context compared to the lower salience context. This effect wasn't observed in the participants for whom the implementation intentions weren't developed.

In our view, this shows that although linking the goal associated with the implementation intentions (new behavioral goal), to the cues associated with habitual behavior is important to increase their success, this might also be achieved through other ways. Thus, when this cannot be achieved, context changes might be enough to facilitate the desired response associated with implementation intentions targeted to this facilitation. Therefore, for certain choices and decision contexts, we might not need both to associate the new goal with the old (habitual cues), and to change the context and one of them should be enough, depending on the situation and behavior (Holland *et al.*, 2006). With our study 5 we complement the findings of Holland *et al.* (2006), by showing that an increased attention to the cues associated with the new goal (organic means) by developing the implementation

[45] Having a context with a higher salience of organic means (lower price for organics and higher availability) would be perceived as too artificial and unrealistic and therefore, we chose only to have an equal salience condition to reduce the bias introduced by this.

intention (instead of connecting the new goal to the old cues) accompanied with a change in context to make them more salient, is effective in overruling the cuing of habit from the "old" cues (non-organic means).

Accordingly, study 5 showed that a change in context is not enough to produce successful results in behavior change, given that this effect had a higher magnitude, only when combined with the implementation intentions. In other words, the manipulation of the context by itself still wasn't sufficient for the implementation intentions to overcome habits in a low salience condition, i.e., when the non-organic buying means were more salient and therefore the habit activation potential was higher. However, although our results weren't significant in the manipulations we used to overcome this, there are reasons to believe that this can be accomplished when a suppression effect from (goal) priming is induced. Accordingly, study 5b showed that it might be important to prime the goals associated to the habitual behavior in a way that induces their suppression. In this regard, by promoting goal activation and attainment in the same task (see study 2 and 5b), seemingly has the consequence of inhibiting it (Liberman *et al.*, 2007). However, following from results in study 2, it should be taken into consideration that this effect might only be expected for people with a strong habit. For people with a weak habit this procedure might have the ironic effect of increasing the strength of the habit we want to "break" and therefore, caution should be taken in using it.

Despite of this, its implementation intentions facilitative effects, can be seen as a "vaccine" effect similar to the classical inoculation effect found in the literature regarding persuasion (see McGuire, 1964), which considers that "being forewarned of a persuasion attempt can help people resist persuasion" (Smith & Mackie, 1995; p. 304). Accordingly, being forewarned of our socially undesired habits can help people resist the "temptation" of falling prey to them. This effect hasn't been studied on habit research although it finds some

support in the literature on self-regulation and goal attainment, which shows that in order to attain goals, some cognitive flexibility is needed to resist the salient temptations with which the desired goals are in conflict (Fishbach & Shah, 2006). This awareness can allow the blockage of the unwanted influences or "temptations" while at the same time the implementation intentions are directed toward goal pursuit (Gollwitzer *et al.* 2005).

Overall, these studies raise some important questions regarding the pre-conditions under which a habit can "break" the implementation intentions effect, and an implementation intention can "break" a habit. Specifically it showed the context's role, namely familiarity and situational features salience as important factors in this sense. Additional studies should be conducted regarding other important preconditions, in order to comprehend the situations role in constraining or facilitating a habit. Also, more research should allow the study of its role either as a barrier or facilitator (regarding the suppression effect) to a conscious intention to behave in an environmentally friendly way to buy organic food.

Nevertheless, these studies and the ones from the previous chapter (studies 1, 2 and 3) have obvious implications for the development of consumer behavior change programs, since they show that price and availability of organic products in supermarkets and food stores is only the visible part of the problem. In fact, they sometimes work more as post-decisional justifications for not behaving in a certain socially desired way. Consequently, behavior change projects developers must be aware that habits can become accessible and influence behavior and consumers decisions without them being aware. Also, researchers should be aware of the fact that apparently successful behavioral modification techniques can be overthrown by situational features, in simple acts such as a visit to the supermarket, which can elicit a previously established behavior.

Various examples in the real world show that in order to change a "frozen" habit, individuals need to invest in a long-term self-regulatory effort, to resist the temptation of

falling prey to it. Our results indicate that “vaccinating” people by making them aware of their own habits and situational influences on behavior might be a way to constrain their negative effect. This is a new finding not found in the literature regarding habitual behavior change, and our study although not giving a clear and strong support to this, shed some lights regarding it. In other words, more research should be developed in order to assess the efficacy of a joint effect of implicit (e.g. goal suppression techniques) and explicit (e.g. implementation intentions) behavior change techniques, in behavior change efficacy. This is based on the view that consumers and decision makers in general are adaptive decision makers (Palma-Oliveira, 1995; Payne, Bettman & Johnson, 1993) and thus can follow different strategies depending on the context, personal characteristics and the decision target (e.g. type of product).

Accordingly, people should be trained in order to develop “good” habits regarding their environmental and consumer choices, but at the same time they should be trained to become competent in their decisions and behaviors (Corral-Verdugo, 2002; Gaspar de Carvalho & Coutinho de Faria, 2003; Fraijo-Sing, Corral-Verdugo, Tapia-Fonllem & González-Lomelí, in press), in the sense that these “good habits” should resist contextual changes. Therefore, automatic processes should be involved in “good decisions” (determined by “good habits”) but at the same time a certain amount of deliberation and intentional goal attainment should also be involved. This could allow tuning these decisions if needed (i.e., make decisions the closest possible to the desired goal; as in Aarts *et al.*, 1999), as in the case of contextual changes that can disrupt habits. This means that habits dynamism can work either in favor of “bad habits” or “good habits”, depending of the behavior change and maintenance techniques we use.

This “vaccine” effect and other implications of our results still need further study regarding the conditions in which they take place. Nevertheless, we think that our studies, by

applying theories and concepts from Social Psychology in general and Social Cognition in particular to the domain of environmental and consumer behaviors, are a starting point in this regard. Accordingly, this can allow the development of new ways of increasing the success of intentional proenvironmental behaviors development and of people's "vaccination" to resist the temptations of which influence they often are not aware.

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APPENDIX